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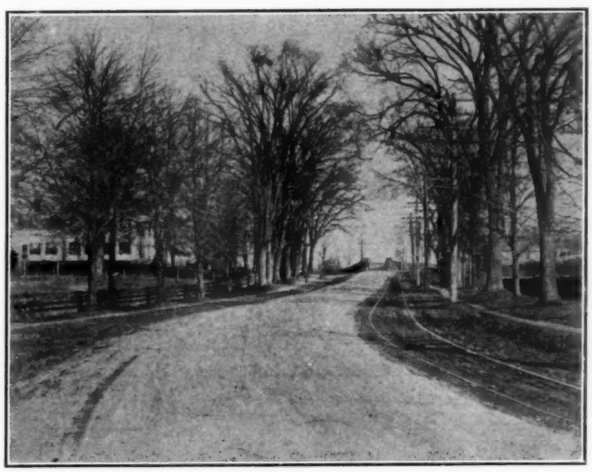
Now Is The Time To Stop—and Think



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More than ⅓ of all the Wood Block Pavements in America

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Municipal Journal

Volume XLIII. NEW YORK, OCTOBER 18, 1917 No. 16

SPEEDING UP CONCRETE ROAD JOB BY BONUS SYSTEM

Contractor Increases by Fifty Per Cent the Amount of Work Done by His Equipment Without Enlarging Gang—Bonus to Every Man for Each Section in Excess of a Daily Minimum.

CONCRETING GANG AT WORK.
Twenty-six of the thirty-two men in the gang can be seen, the others being behind the camera.

Good treatment of the men and a bonus system of payment for all work over a specified amount done per day has yielded big results on the construction of a concrete road in Westchester County, N. Y. The amount of concrete laid per day has been increased nearly 50 per cent with only a small increase in the number of men and with the same equipment.

Good management is much in evidence on this job. By fair treatment of the men and by the bonus system mentioned above, delays due to shortage of men and the trouble incident to hiring and breaking in a large percentage of new men every week have been eliminated. Wherever possible, however, labor saving machinery has been installed and the number of men reduced. By arranging for concrete materials to be delivered without dependence on railways, a fruitful source of delay and trouble due to non-delivery of materials has been avoided. Sand, cement, and stone and gravel are shipped in barges up or down the Hudson to Tarrytown, whence they are delivered by motor truck to the job six or seven miles away.

The road being constructed is known as Repair Contract 1102 of the New York State Highway Department. The work consists of laying a concrete surface on 7.22 miles of old waterbound macadam, which had been given several bituminous surface treatments. The concrete surface is 16 ft. wide, 4¾ inches thick on the edges and 6¾ inches in the center, giving the vertical section of the pavement an area of 8.11 sq. ft. The concrete is mixed 1:1½:3, which is now the standard of the New York State Highway Department for first class roads. The contract price, which includes removing the top part of the old road in preparation for placing the concrete and making one small cut, is about $116,000. Although the contractor has until August, 1918, to complete the work, it will probably be finished this fall, as it is already nearly 70 per cent completed.

During the first part of the work, 24 men were assigned to the mixing gang. This gang averaged 400 ft. of finished road a day. In an effort to increase the amount laid daily, the number of men attached to the mixer was increased to 32, not including the foreman. This speeded up the work somewhat but did not give entire satisfaction. After a conference between the concrete foreman, Bruce Decker, and the contractor, Frank L. Cohen, of Buffalo, the two evolved the bonus system which has since been so successful. Estimating that about 500 ft. should be laid with this gang daily, Mr. Cohen announced that he would pay each man in the mixing gang, 32 in all, a bonus of 25 cents for every 30-ft. section over 510 ft. constructed in a regular 9-hour day. From an average of not much more than 400 ft. laid per day, the daily re-

ports showed at once a jump of about 50 per cent. Since this bonus system has been in force the daily average has been slightly over 600 ft. Several times the amount has run over 700 ft. and on October 4th 750 ft. were laid, setting a record and netting each man in the mixing gang a bonus of $2 over and above his wages.

In ordinary work, where the incentive to hurry is not present, a mixing gang the size of that employed on this job would be unwieldy and the men would get in each other's way. Under the bonus system no man wants to shirk or dares to if he should so desire, for each man sees that every other is busy, as increased pay comes only from extra effort on the part of all. The make-up of the mixing gang is as follows: One engineer; 1 fireman; 2 finishers; 2 men on the forms; 3 men handling cement; 3 men placing concrete; 5 men wheeling and shoveling sand (each man fills his own barrow); 10 men wheeling stone, and 5 extra stone shovelers. In addition there is the foreman.

Every effort is made to handle materials without waste of time or effort and wherever possible materials are so arranged that they can be reached with least trouble and confusion. Sand and stone or gravel (both are used) are dumped in alternate piles on the subgrade, leaving enough room on one side so that a team or motor truck can come up with extra materials if there should be a shortage. Cement bags are tied in bundles and thrown in the field along the road, whence they are picked up by a light motor truck which the contractor maintains for utility work. Cement is distributed in neat piles along the road. When the mixer is running (and this is practically all the time with the bonus system in operation), two men open the cement bags and stand them in a double row along one side of the road close to the form. Here they are out of the way and the cement feeder on the mixer has nothing to do but reach for the bags and empty them into the scoop. In wheeling sand and stone, the loaded barrows take one side of the road and the empties the other side. A Koehring No. 16 mixer is used and this is charged with 3 bags of cement, 2 barrows of sand and 4 barrows of stone or gravel, each barrow being loaded to hold about 2⅛ cu. ft. (theoretically 2.14). This makes a 1:1½:3 mix.

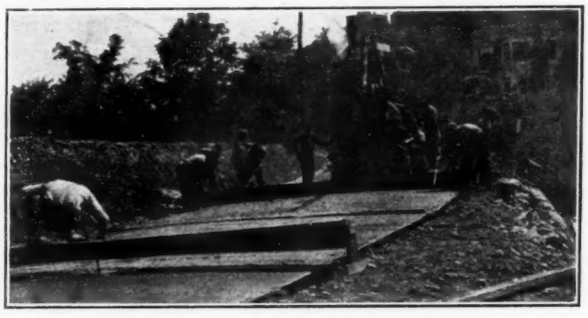
The road section is parabolic. Kahn expansion joints are placed at 30 ft. intervals. Five-inch channels are used for forms and these are held in place by iron pins driven into the ground through perforated ears attached to the forms. About 1,600 ft. of forms are in use. Lately the steel forms have begun to show signs of hard usage and, since the steel forms are hard to get, they are now being replaced with wooden forms made of 2 x 6 timbers planed down to the proper size. These are held in place in the same manner that the steel forms are and in addition an iron spike connecting each timber with the adjacent one insures a smooth joint. All forms are in 10-ft. sections.

STEAM-OPERATED SCARIFIER ATTACHED TO ROAD ROLLER.

After the concrete is placed it is brought to the proper section with a strike board cut to the proper section and the surface is then floated, using long-handled wooden floats at first and finishing from a bridge. For working around the expansion joints, a split float is provided. Before the final set takes place the surface is broomed, and finally is covered with earth and kept moist to protect it while curing.

In preparing the road for the concrete surface, the old macadam and the bituminous mat are scarified by means of a Buffalo Pitts roller with spiked wheels equipped with a steam-operated scarifier attached to the roller. Following this, the road is brought to rough grade with an Austin-Western "Giant" scraping grader, which also is drawn by a steam roller. With this machine the contractor is able, except in places where large stone has been used in the foundation course, to bring the sub-grading very close to true shape and to reduce hand work to a minimum. All of the excavated material will be used for shoulders. In only one place is there any change in grade and this involves only a small amount of easy excavation to straighten a curve. Here the earth is loosened with a rooter plow and the material loaded by hand into wagons.

The grading, however, is light and this excavating is done by the regular light-grading gang of eight or ten men which follows the grader to bring the subgrade section to proper line and grade. Where the old road is made up of larger stones, more work is necessary, as here the grader cannot work so effectively. In this case the grading gang is increased.



STRIKING OFF PAVEMENT AT CURVE.

Water for the concrete work and for the machinery has been secured, except for a short length of road, from the supply systems of Briarcliff Manor and, as the work progressed, Tarrytown. These systems furnished water under sufficient pressure so that no pumps were needed. The small distance noted above covered a section of about a mile and one-half midway between the two villages, where the water was pumped from a stream. A two-inch main, plugged every 300 feet, carries water.

The contractor sublet to J. B. Rose & Co. the contract for furnishing all stone or gravel, sand and cement needed, the materials to be delivered on the job as needed in any amount up to 500 yds. a day. As stated before, the method of handling made the contractor independent of railway delays, delivery being made by barges and motor trucks. The haul from Tarrytown, the delivering point on the river, to the work varied from 2 to 6½ miles. From 12 to 18 motor trucks were employed at times, in order to furnish sufficient material to keep the contractor operating at full speed. Included in the fleet

were the following makes of trucks: Mack, Garford, Pierce-Arrow, United, Gramm-Bernstein, and Saurer. Most of these were 5-ton trucks and carried, generally, 4 yds. of material. The trucks averaged 10 trips a day on a 3-mile haul and on the 6½-mile haul made 6 or 7 trips. All the trucks are equipped with self-dumping devices, and at the dock stone and sand are loaded into them from a bin, so that little time is lost in loading and unloading. The road from Tarrytown is in good condition and there has been little delay or trouble from any source. The barges are unloaded by derricks, which store the materials in bins.

The contractor is Frank L. Cohen of Buffalo. J. Bruce Decker is in charge of the concreting work and is largely responsible for the good showing made by that department. W. A. Johnston is superintendent. All other men were hired locally by the contractor. Thomas L. Way

USING LONG-HANDLED WOODEN FLOAT.

is in direct charge of the work for the New York Highway Department under Bertrand H. Wait, division engineer for this section, with office at Poughkeepsie.

TRACKLESS TROLLEY AT BRADFORD, ENGLAND.

Bradford, England, has been operating a municipal trackless trolley since June, 1911, and finds a number of advantages in such system as compared to regular trolley lines. The chief of these is the low capital expenditure, which is only about one-tenth of that required for a system with tracks. Thus it has been possible to supply service to many rural and suburban sections where laying a track would be out of the question. This service is regarded in Bradford as a pioneer, preceding the installment of the regular trolley route and serving as a feeder for such routes. These cars also are used as connecting links between the terminals of existing trolley lines. There are now in Bradford 9½ miles traversed by the trackless service and in 1916 there was a car mileage on such routes of 322,390. Eighteen cars were operated and the total operating cost, including interest and sinking fund charges, was 15.5c per car-mile. The number of passengers carried was 3,402,985. The average fare per mile was 1.3c, fares being rated according to the distance travelled.

Each car seats 29 persons and is run by a motorman and conductor. The current is obtained from overhead trolley wires and the vehicle runs upon the pavement on solid rubber motor truck tires. The cars are said to be less noisy and less odorous than the gasoline-driven motor busses. They cause considerable damage to the roads over which they run and these require regular attention and care, as a smooth pavement is necessary to successful operation. An exact statement of profit and loss seems to be impracticable, since these cars take current from the same feeders that supply it to a regular trolley system, and the relative amounts of current used by the two is not known.

BROOMING FINISHED PAVEMENT.
This is done after pavement has taken slight initial set.

These cars do no freight business or parcel delivery, but on the regular trolley systems of the city a parcel delivery system has been in successful operation for a number of years. An innovation is the operation of a truck which follows the line of the rails, taking current from the trolley wires, and is operated between scheduled times of the ordinary trolley service. This truck is fitted with accumulators which take their supply of current from the overhead wires, by use of which stored current the truck is enabled to leave the trolley route at any point for delivering goods.

RECOVERING IRRIGATION WATER

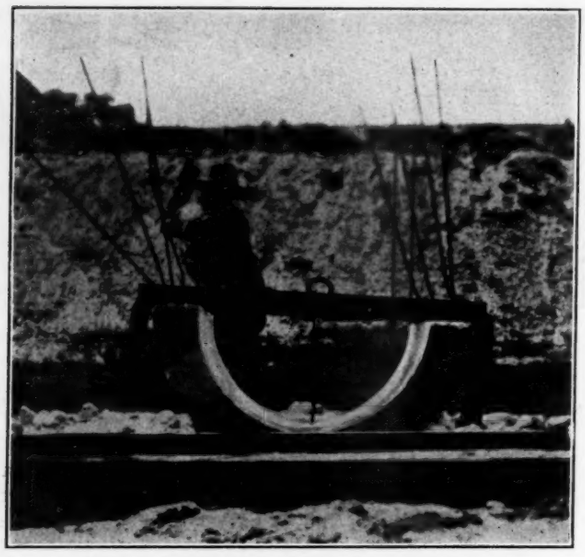
Los Angeles Constructs Long Infiltration Gallery in River Bed—Novel Method of Constructing Reinforced Concrete Conduit and Gallery.

By C. W. GEIGER.

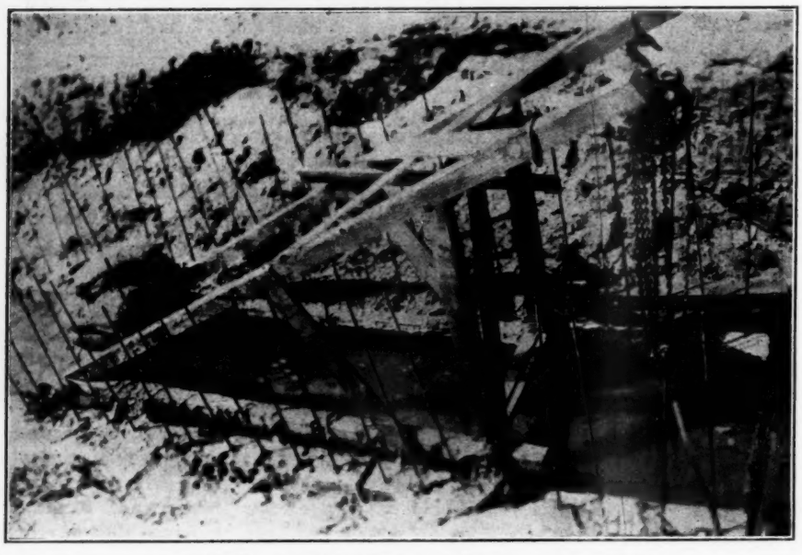
Part of the water which enters the upper end of the Los Angeles aqueduct is used for irrigating lands in the San Fernando valley, and a considerable part of this finds its way ultimately into the Los Angeles river. This river during the summer and fall has only an underground flow, and although the irrigating water considerably increases this, it is not accessible by ordinary methods of drawing from river supplies. For the purpose of recovering this water for further use, a reinforced concrete infiltration gallery is being built in the Los Angeles river. The gallery will be 12 ft. and more under the bed of the river in order to intercept the underground flow, which travels at practically this depth. As the underground flow has been filtered through several miles of sand and gravel, and any surface flow must pass through several feet of similar material lying over the gallery before reaching it, it will probably contain little if any suspended matters. However, up to a point above the packing houses no water will be taken from the river; but from this point up, water will enter the infiltration gallery through the joints, as explained below.

About 8,000 feet of conduit will be laid in the river bed, extending up stream from a pumping station. About 6,000 ft. of the conduit will be tight and 2,000 will have open joints and serve as an infiltration gallery. The water found entering the excavation is being analyzed as the work progresses, and the open joints will not begin until analyses show it to be free from objectionable matters in suspension or solution. An electrically-driven centrifugal pump with a capacity of 6½ million gallons daily will take the water intercepted by the infiltration gallery and force it into the city mains and the Hazard reservoir, to be used by the city.

The combined conduit and gallery is constructed of



CLAMP USED TO LOWER "BISCUITS."



CRANE FOR SETTING INVERT "BISCUITS."
Wheels on which crane rolls rest on top edges of invert already set, and which is running nearly full of water.

reinforced concrete, is elliptical in shape and averages 42 inches in diameter. In constructing it, an invert is cast in sections forming half the perimeter, which sections are locally called "biscuits." Each biscuit contains eight pieces of reinforcing steel, four on each side, the ends of which extend sufficiently to permit their serving as reinforcement for the upper half or arch of the sewer, which arch is poured in the trench. The forms ued in casting the biscuits consist of two pieces of sheet iron for the inner and outer surfaces, and inch boards locked to the form at the two spring lines, each board containing four holes through which the steel reinforcing rods extend. Enough of the biscuits are made at one point to extend a distance of 700 ft., after which the mixer, forms, etc., are moved up 700 ft. and biscuits cast for the next stretch of the same length; it being estimated that this distance is the maximum over which the biscuits can be transported economically. The concrete mixer is operated by an electric motor and receives its current through a cable leading from a main power station located near the end of the conduit.

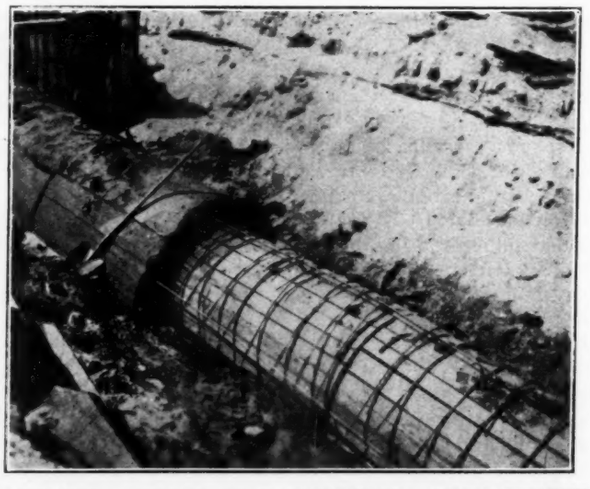
The biscuits are transported from the mixer along the trench by means of a travelling crane mounted on a platform, with double flanged wheels that run on a track paralleling the trench. The biscuits are handled by a clamp shown in one of the accompanying illustrations. This clamp can be locked open, as seen in the photograph, and placed over a biscuit. The crane is then hooked to the clamp, and when the latter is unlocked the two downwardly projecting arms clasp the biscuit, closing somewhat like a pair of ice tongs. After the biscuit has been deposited in the trench, it is set in position by means of a crane carried on wheels that roll on the edges of the biscuits already set. This crane is attached to the biscuit by means of clips that slip over two of the steel reinforcing rods.

The biscuits are made with the contact edges bevelled so that when they are placed in contact there is a V-shaped opening on the inside of each joint. For the first 6000 ft. these joints are made tight by filling them with cement mortar. Wherever the conduit is to act as an infiltration gallery, however, the openings are filled with gravel and small broken stone to permit the water to enter.

In building the arch, inside forms are used consisting of two quarter-segements hinged at the top and supported on the invert already set. When the inside forms have been placed the reinforcing steels are bent to shape and the outside forms put in position, these consisting of two sections, one on each side, which leave an open space about 18 inches wide at the top through which the cement is poured. An electrically-operated concrete mixer travels along the edge of the trench and discharges the concrete through a chute directly into the form.

The mixer is moved along the edge of the trench by means of a cable operated by a drum which is mounted on the platform that carries the crane that transports the biscuits.

This general type of conduit was selected partly at least because practically all other desirable methods of building concrete conduits are patented and the city did not wish to pay royalties.



COMPLETED SEWER IN BACKGROUND; ARCH CENTER AND REINFORCEMENT IN FOREGROUND.

A steam shovel is used to dig the trench for the conduit. Excavation was started at the point where will be located the pumping station for handling the intercepted water. The underground flow of the river, of course, enters the trench, and three pumps operated by electric motors are used to remove this water. One of these pumps throws a 10-inch stream, another an 8-inch stream and a third a 5-inch stream. The sand and gravel removed by the steam shovel in digging the trench are piled up along one side of the trench and will be replaced after the construction is completed. Should it be found that it cannot be completed before the annual rainy season begins, the conduit will be closed and the machinery removed from the river bed, and work will be resumed again after the rainy season is over.

ACTIVATED SLUDGE PROCESS FOR STOCK YARDS

General Description of Plant Proposed for Treating Sewage From Chicago Stockyards District—Estimated Cost of Construction and Operation.

About a year ago Langdon Pearse and W. D. Richardson, representing the Sanitary District of Chicago and the Stock Yards Interests of that city, respectively, began an investigation into the matter of treating the sewage of Packingtown by the activated sludge process. A progress report was made last November and a final report has recently been submitted to the engineering committee of the Sanitary District and the committee representing the stockyards interests.

The amount of sewage to be treated is estimated to total about 50 cu. ft. per second of industrial sewage and 11 cu. ft. of domestic sewage between 8 a. m. and 8 p. m. of an average day, and to average 23 cu. ft. per second of industrial sewage and 7 cu ft. of domestic sewage between 8 p. m. and 8 a. m., these being the figures for 1916; while for 1930 the average day flow is estimated at 58 cu. ft. of industrial sewage and 15 cu. ft. of domestic sewage, and the night flow at 28 cu. ft. of industrial and 9 of domestic sewage.

In the progress report the investigators stated that: "After careful consideration of all the material, we have come to the conclusion that so far as the question of purification of the sewage is concerned, the activated sludge process will handle the sewage originating from Packingtown in a manner which will produce an effluent suitable to discharge into the channel of the Sanitary District."

The authors stated that "No (activated sludge) plant is in operation in the United States, either on domestic sewage or trade waste, in which all these elements are carried out on a continuous working basis. Until a large scale unit has demonstrated the efficiency and practicability of the process, on domestic sewage and particularly on trade wastes, including packinghouse sewage, the process cannot be recommended without qualification as a practical solution of the Stockyards sewage problem." This point of the absence of experience with plants in service is again referred to in the statement: "While there is no large activated sludge plant in continuous operation, completely equipped, on the other hand the test plants and small installations report encouraging results on the purification accomplished. The sludge problem, however, has only been handled on a small scale, or in a manner which does not apply here." "There is practically no available data on the cost of operation of an activated sludge plant of the size recommended herein, even on domestic sewage. The operating figures from plants like Worcester and Providence have been helpful." "In the present state of the activated sludge process, there is no large plant operating to determine operating and recovery costs, nor have any of the smaller plants running ever operated over a long enough period to determine the life and efficiency of the air distributors, and certain other parts of the plant. Up to the present time the pressing and drying of activated sludge has not been worked out to a thoroughly satisfactory conclusion. The only successful experiments of which we have knowledge were conducted at Milwaukee last summer. They were continued for a short period of time only, with one press of a comparatively new design. This press is expensive to install and of limited output." Finally, in their conclusions, they say: "Although no large activated sludge plant is in operation at the present time, either on domestic sewage or trade waste, and although no smaller plant has been operated continuously as a complete unit in such a way as to deliver a purified effluent and also to handle the sludge in a sanitary way by pressing and drying, nevertheless we know of no place where it has been a failure. Consequently, in our judgment, the activated sludge process offers the best promise of a solution of the Stockyards sewage problem of any suggested up to the present time."

In view of this lack of previous experience, the investigators recommend that at the present time one complete unit of the type of sewage treatment plant proposed be installed, to determine definitely the practical success or failure of such type of plant; such unit, including whatever machinery is necessary for its proper operation, to be built and operated in every way as a complete plant in actual service. During the present year Swift & Co. has installed and put into operation an activated sludge plant capable of handling in 24 hours approximately 600,000 gallons of typical concentrated packinghouse sewage, this plant being equipped with full-size filter press for the handling of the sludge, with a view to conducting extensive experiments to determine the best means of sludge concentration and drying. The results obtained by this plant will be availed of by the committee both in building its unit installation and in forming its conclusions as to the most effective details of construction and operation.

In addition to activated sludge tanks, it was considered that devices should be installed to catch grit, retain grease and screen out coarser solids arriving at the plant prior to the activated sludge treatment. The grit chamber would be such as to produce a minimum velocity of 1 ft. per second, part of it serving also as a tank from which to skim the grease from the surface of the sewage. Coarse bar screens with a clear opening of about 1 inch would be followed by fine screens with meshes or slots of one-twentieth to one-thirtieth of an inch in diameter. If there is pumping, these screens should be set ahead of the pumps.

It is estimated that the amount of grease collected would be more than 1,000 lbs. per day, and more than 3,600 lbs. of ether-soluble material, based on an average flow of approximately 50,000,000 gallons for 24 hours.

THE PLANT PROPOSED.

In accordance with results obtained at the testing station conducted by the Sanitary District, the design for a plant to produce complete stability in warm weather was based upon the following assumptions:

1—The aeration of the screened sewage in continuous-flow tanks using 4 cu. ft. of air per gallon of sewage, with an 8-hour contact period of sewage and activated sludge.

2—Sufficient sludge storage capacity in the aeration

tanks to care for 140 per cent of the sewage entering the tanks. Approximately 40 per cent of the incoming flow is returned from the settling tanks, as a mixture of sludge and sewage.

3—The depth of the tanks has been fixed at 16.5 ft. over the plates. The air distribution proposed is through filtros plates set in unit boxes of cast iron. The ratio of the area of filtros plates to the superficial area of the tank is about 1:6; 1,080 sq. ft. of plate area is provided for each unit, of 1.5 million gallons daily, or 720 sq. ft. per million gallons daily.

The complete design suggested includes 32 activated sludge units, but, as stated above, it is recommended that only one be built at present, to be operated for a few months as an experimental plant. Each unit is 38 ft. 4 inches wide by 160 ft. long, with 16.5 ft. of water depth over the plates. The tank is divided by wooden baffles into 3 longitudinal channels in series. A covered pipe gallery is planned between the batteries of tanks, in which air and sewage mains can be carried. Individual air and sewage meters are included in each unit, in addition to the two large meters which handle the entire flow of air and sewage.

After thorough agitation in the aeration tanks, the liquid will pass to settling tanks of the circular Dortmund type, 30 ft. internal diameter and with a water depth of 33.5 ft., and with hopper bottoms having a slope of about 60 degrees with the horizontal. A settling period of about 1 hour is proposed.

In order to prevent clogging of the filtros plates with oil, soot, dust, etc., air washers are provided ahead of the compressors. The estimates were based on the use of electrically driven centrifugal compressors of the type made by the De Laval Steam Turbine Co. or the General Electric Co. The power required to provide 20,000 cu. ft. of free air per minute under a pressure of 6 lbs. per square foot is 700 h.p., and 1100 h.p. for a pressure of 10 lbs.

"At the present time filtros plates offer the most satisfactory air distribution. Although the cost of maintenance may be somewhat higher than perforated pipe grids, we believe the distribution is better and size of air bubbles is much smaller, with consequent increase in efficiency. The basswood plates now being tested in Milwaukee produce a remarkably fine air bubble, insuring a considerable reduction in the use of air. The life of basswood plates is at present very uncertain, because of possible decay."

While the activated sludge process is peculiarly successful in producing a clear effluent of desired stability, it also produces an enormous volume of very liquid sludge, which must be handled while comparatively fresh. Treatments suggested include concentration or re-aeration followed by separate sludge digestion, lagooning, air drying, and filter pressing. The experience of the Sanitary District is similar to that at Cleveland, indicating that normal activated sludge will not dry as quickly or as readily as Imhoff tank sludge. This appears to be an inherent difficulty in colloidal sludge. When applied to a sand bed, part of the sludge sinks, part floats, and the water separating out is between. The only method for recovering the material of value that has been demonstrated is by filter pressing and heat drying. Possibly the yeast fermentation method developed at Dublin may offer a suitable alternative for filter pressing, but so far it has not been tested on activated sludge. Experiments of the Sanitary District indicate that the sludge can be concentrated 50 per cent in volume with 2 or 3 hours quiescent settling, the depth of settling tank seeming to have practically no influence on the moisture content of the concentrated sludge.

The cost of pressing sludge is estimated as follows, this estimate being based upon 96 tons per day of dry material:

75 lin. yd. No. 8 duck, 120-in. wide	$132.00
Repairing and renewing racks	10.00
Oil, waste and miscellaneous	13.00
Labor	109.00
Power, 311 h.p.=232 kwh. at 0.7c per hour for 24 hrs.	39.10
Interest and depreciation*	246.29

Drying the same amount of sludge is estimated to cost as follows:

Coal at $1.75 per ton	$64.75
Repairs and renewals	29.00
Other supplies	1.25
Labor ($2.40 per day)	32.40
Power, 157 kwh	26.40
Interest and depreciation*	81.19

This gives the total for drying of $234.99; and the average cost per ton for pressing was therefore $5.72 and that of drying, $2.45. The sludge cakes produced by the filter press are assumed to have 75 per cent moisture, and to be dried to a moisture content of 10 per cent. The estimates are based on direct heat dryers of the Ruggles-Coles type.

The cost of constructing the plant was estimated at $3,489,800, some of the more important items being $778,140 for 32 units of aeration tanks, $122,090 for 32 units of settling tanks, $30,880 for 8 units of sludge tanks, $13,000 for one skimming basin, $160,920 for air piping, $46,700 for sewage piping, $25,700 for sludge piping, $57,050 for drainage piping, $5,000 for water and flushing pipes, $564,080 for compressors, mechanical equipment, house, etc., $784,340 for sludge press and drying house, and $120,260 for screen and pump house. $278,000 of the total was for an intercepting sewer, grading grounds and river front work which were not essential parts of the treatment plant.

For operating, it was believed that two laborers working during the daytime should be able to attend to the grease skimming and that the grit chamber can be cleaned on Sundays, when the help of an extra man might be required. For operating the aeration tanks three shifts are provided, working in 8-hour watches, each consisting of a foreman and 3 laborers, with 2 extra laborers in the day hours. One laborer for each watch is provided for the sludge concentration tanks. For the sludge pressing, for each watch, a crew of one foreman, 3 operators and 3 helpers to handle the press operation, 6 laborers to move pans of press cake, help clean presses, etc., and 1 extra laborer. In addition, 2 seamstresses are provided to make filter bags. In the drying room 3 laborers in each watch are provided to handle the driers, coal, and drier feed; also 2 laborers for handling coal and ashes at the drier plant. For the air compressor plant there is alloted an engineer in charge, with 2 oilers in each watch. For the heating plant a fireman is provided for each watch, though it is probable that the waste-heat from the dryers can be utilized for heating the buildings in winter. For the general up-keep of the plant there is provided a steam fitter and helper, machinist and electrician, and for general labor or emergency work in the plant at large, 3 laborers. In addition, there is provided a superintendent, who should be a trained chemical or sanitary engineer, with one assistant in each watch. Also, for the laboratory, a chemist, assistant chemist and helper. This makes a total of 98 employees connected with the plant.

Concerning the returns available by the sale of material, the authors of the report believe that a conservative estimate would be $12 per ton for the dried sludge, and that grease can be reclaimed for ¼c. per lb. and

*Interest is taken at 5 per cent, and depreciation at 5 per cent on boilers, motors, pumps and all machinery, at 4 per cent on water pipe, buildings and concrete structures, 7 per cent on air piping, conveyors and dryers, and 20 per cent on filtros plates.

net 4c. per lb., yielding a return of 1/15th as great as the sludge. If there were 100 tons of dry sludge per day, this would give an annual return of $310,000. At present prices for nitrogenous fertilizers, the dry sludge might bring as high as $18 per ton, and the returns from 100 tons per day would then be $462,000 a year.

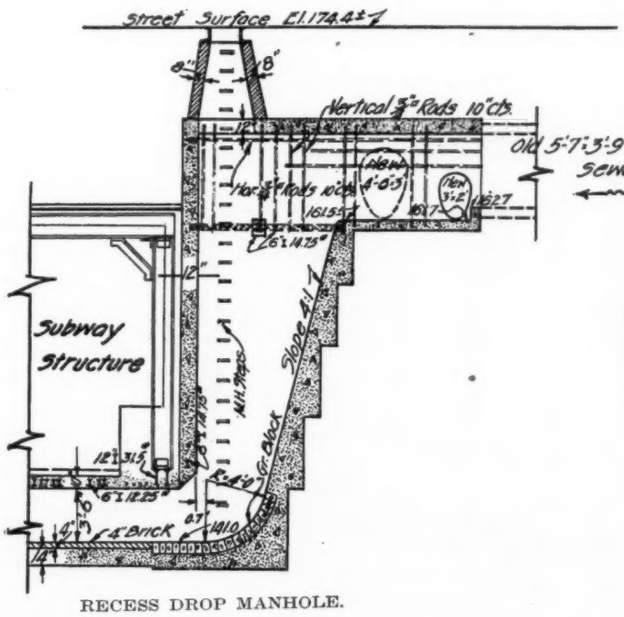
The summary of the estimated annual cost shows this to total $455,700 for operating (of which $270,000 is for power), $178,670 for depreciation, and $187,577 for interest; a total of $821,947 for a plant having a capacity of 50 million gallons daily and producing 96 tons of dry material. Deducting the maximum estimated return leaves the annual cost about $360,000 a year, or $20 per million gallons treated. If the lower returns from sale of sludge be used in estimating, the net cost becomes about $540,000 per year or $30 per million gallons.

Mr. Pearse recommended for the initial installation a fine-mesh screen, grit chamber and grease skimming basin to handle the entire flow of sewage; also screw pumps, motor driven, to pump the sewage and deliver screened sewage to the unit plant; and that this should comprise one unit each of aeration tank, settling chamber, sludge concentration tank, filter press and appurtenances. Mr. Richardson agrees with this except that he would omit the grit chamber and grease skimming basin, and would substitute a centrifugal pump for the screw pump.

DROP MANHOLES FOR SEWERS

Conditions for Which Required—Characteristics Desirable—Open, Recess, Pipe, and Channel Drops —Cascade and Ramp Drops.

In a paper before the Municipal Engineers of the City of New York, Irwin W. Whittemore, assistant engineer of the Public Service Commission, described the several types of drop manholes used in New York City in the reconstruction of sections of the sewerage system necessitated by the construction of the subways; in connection therewith discussing briefly the advantages and disadvantages of the several types. A brief abstract of the paper is given below.



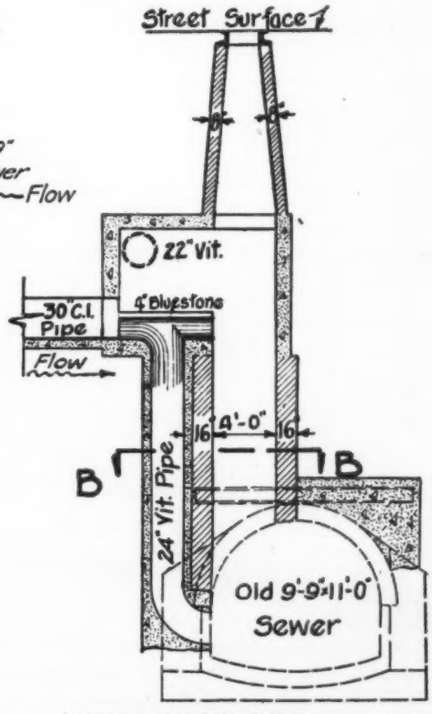
RECESS DROP MANHOLE.

Drop manholes are generally used to meet one of two conditions: The surface of a street may be so steep that to build a sewer parallel to it would cause a velocity of sewage which would result in erosion and abrasion of the sewer invert, which may be avoided by using flatter grades connected by drop manholes. The other condition is the interference of other underground structures with the continuous grade of the sewer, requiring it to be carried under such structures either by an inverted siphon, or by a drop manhole at the up-grade of such structure and a sewer with flattened grade carried from the bottom of such manhole underneath the structure. A third condition occasionally exists, where a main or intercepting sewer is carried at considerable depth, sometimes in a tunnel, in which case the tributary sewers, which are at a much higher elevation, are connected with it by drop manholes.

In addition to the cost of such manholes an objection to their use exists where the sewage is to be treated by screening, since the churning up of the sewage which occurs in drop manholes results in a mechanical disintegration of the solids and thus considerably reduces the percentage of suspended solids that can be removed by screening.

Where a drop manhole is to be used, it should as far as possible possess the following characteristics: Accessibility for examination and cleaning; protection of the interior of the manhole from excessive erosion; and the reduction to a minimum of any deleterious effects on the sewage which may make it unsuitable for the method of disposal which is in use.

The first object of the design should be to obtain a manhole which will afford convenient access to all sewers radiating therefrom. This requires that a man be able to enter the manhole and examine and clean the sewer during dry weather without coming in contact with the flowing sewage. To accomplish this purpose, vertical pipes are sometimes provided in which the dry-weather flow is confined while it is passing from the upper to the lower sewer. In other cases a vertical recess is provided of a sufficient depth so that the falling stream does not encroach upon the manhole shaft proper. In special cases it is sometimes desirable to have the manhole



PIPE DROP MANHOLE.

accessible during times of storm as well as during dry weather. In some cases separate vertical chambers confine both the sewage and the combined storm flow so that the manhole proper can be entered safely.

Erosion of the bottom and inside faces of the manhole may be prevented by providing a free path for the storm flow so that no erosion can occur except at the bottom and lining the bottom with a wearing surface of vitrified brick, granite block, or other hard durable material. Water cushions also are sometimes used at the bottom where the drop is considerable.

Various means for breaking the fall have been devised and used for the purpose of minimizing erosion from both dry-weather and storm flows. These cause considerable churning, however, and it is well to design drop manholes, when they are unavoidable, so as to minimize churning.

The several types of drop manholes are classified by Mr. Whittemore as follows: The open drop; the recess drop; the pipe drop; the chamber drop; and the cascade and ramp drop.

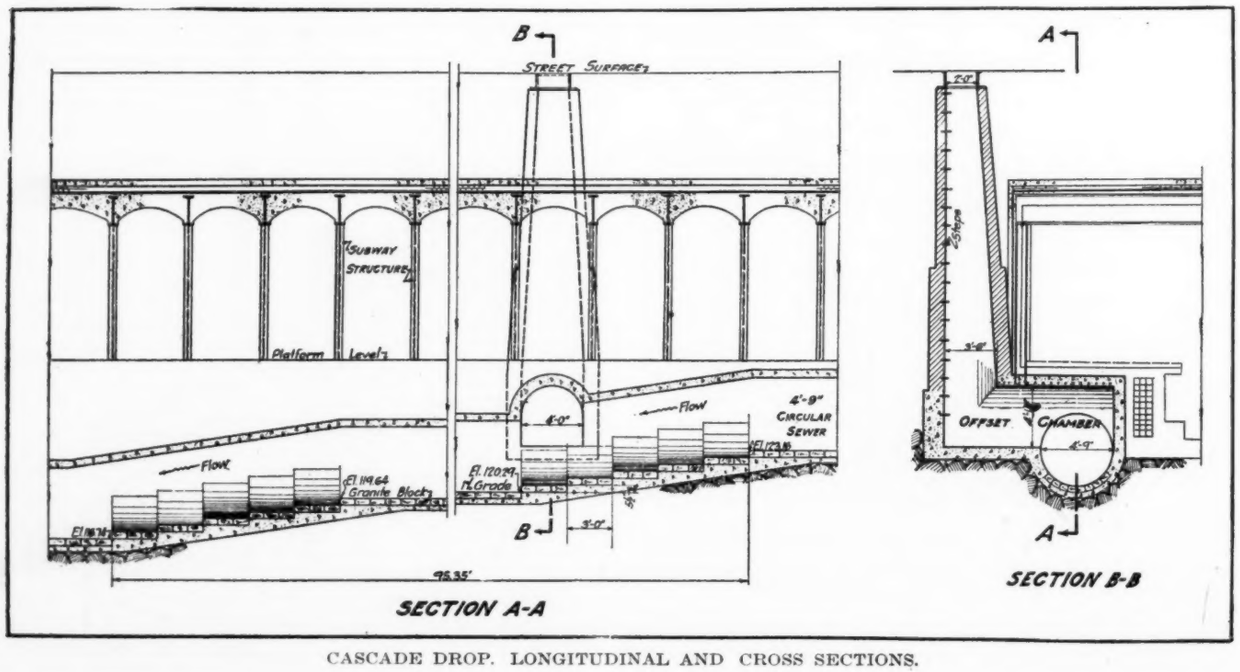
The open drop is merely an ordinary manhole sometimes slightly enlarged in diameter, into which the sewer discharges. This type should be used only where small sewers of moderate flow are concerned.

In the recess drop manhole the side of the manhole towards the upper sewer is sloped from the bottom of the manhole to the invert of such sewer, so that at such invert the diameter parallel to the axis of the upper sewer is considerably greater than at the bottom of the manhole or than the upper portion of the manhole above said sewer. In New York the slope of one to four is common. This produces a recess in the manhole below the upper sewer, down which recess the sewage from such sewer glides. The junction between the slope and the bottom of the lower sewer is curved with a radius of 3 to 5 ft. in the case of large sewers, and is lined with paving blocks. Where only pipe sewers enter the manhole at the higher elevations, the recess may be a bay extending a foot or two from one side and with vertical walls, the upper pipe sewer merely extending through the wall of such bay and the sewage therefrom dropping down in such recess to the bottom of the manhole. This construction should be confined to house sewers only.

In the pipe drop, a vitrified pipe is attached to the outside of the manhole wall, entering through the wall at the bottom of the manhole by a bend of approximately 90 degrees. In the case of a combined sewer, this pipe is supposed to carry the dry-weather flow only, and the upper sewer is continued through an opening through the manhole wall, through which opening a considerable part of the storm water is discharged, the opening in the invert of the upper sewer by which it connects with the drop pipe serving as a leaping weir. If the upper sewer carries house sewage only, all of the sewage should drop through the drop pipe, but the line of the main sewer should be continued by an opening through the wall of the manhole to allow inspection and cleaning of the main sewer. "The advantage of this type lies in the dry weather flow being confined entirely to the drop pipe, thus facilitating inspection of the manhole. The disadvantage is the liability of the bottom bend of the drop pipe becoming frequently obstructed; causing the flow to fall into the manhole proper, and requiring cleaning."

The chamber drop is similar to the pipe drop, except that a separate chamber takes the place of the pipe, ordinarily being constructed by building a curtain wall across the manhole near one side. This chamber is made of such dimensions as to permit the entrance of a man for inspection if occasion requires. This type, like the pipe drop, provides a dry chamber for inspection at all times. It is probably more economical for high drops than the recess type would be, but it is more costly than the pipe drop.

The cascade or ramp drop should not strictly be called a drop manhole, since it takes place over a considerable length of sewer, a manhole ordinarily being provided at about mid-length of the cascade. The cascade consists of a series of steps in the invert of the sewer, which are generally paved with granite or vitrified blocks. The ramp consists of a steep incline in the sewer without the steps. The use of steps was adopted in New York because they render the cleaning and interior examination of the sewer safer for the men and prevent the development of such high velocities of sewage flow as would be developed with a ramp construction, thus reducing erosion of the lining of the sewer below the ramp.



CASCADE DROP. LONGITUDINAL AND CROSS SECTIONS.

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Municipal Journal's Information Bureau, developed by twenty-one years' research and practical experience in its special field, is at the command of our subscribers at all times and without charge.

MACHINERY IN SEWAGE TREATMENT.

It undoubtedly has impressed most of those who have read descriptions of activated sludge systems of treating sewage that there was more power and machinery employed than in any of the older processes of treatment, but probably few realize to what an extent this is true. This point is brought out quite prominently, however, in a report which is abstracted in this issue, in which the engineers describe a general plan for a plant to treat 50,000,000 gallons a day of sewage from the Chicago stockyards district. Of a total estimated cost of about $2,760,000, $1,470,000 is for machinery and buildings to house the same. The plant is to be operated by electricity and an energy of 9,050 kw. will be required, operating about 50 motors. The operating cost is estimated at $455,700, of which $270,000 is for power and $98,000 for supplies and repairs. The amount of attention required by the plant, also, is indicated by the fact that 98 men are considered necessary for this purpose, this including engineers, oilers, press operators, electrician, machinist, steamfitters, etc., as well as day laborers.

A large part of this machinery and operating cost is in connection with sludge pressing and drying, but some such treatment of the sludge seems to be generally considered to be necessary in large installations of the activated sludge process, more necessary, perhaps, than in any other. Aside from this, however, nearly one-half of the estimated cost of the above plant was required for providing compressed air for the aeration tanks and for the screen and pump house, which are necessarily independent of any treatment of the sludge.

This feature of this process should be carefully considered in deciding whether it or some other shall be adopted in any particular case. Extensive machinery means the continual employment of engineers for operating it and an annual outlay for repairs and supplies as well as for fuel. It also probably means a higher rate of depreciation and of obsolesence than obtains with almost any other method of treatment. For plants located in large cities where mechanics are readily available and of such size that a number of employees must be retained on any type of plant to supervise it, this may not be an objectionable feature when balanced against the advantages of the treatment; but in a small community where the conditions above named are not found, and where a plant of another kind might be operated with the constant attention of only one man of fair intelligence, an activated sludge plant involves altogether too high a cost for maintenance and for operation as compared with other systems of treating sewage, even though such systems hold out no promise of returns from the sale of fertilizer materials or grease.

LIBERTY BONDS FOR SINKING FUNDS.

When the first Liberty Bonds were offered for sale, we suggested that it would be a patriotic move for the cities of the country to invest some of their Sinking Fund Deposits in these bonds. Some cities have followed this suggestion, but probably the largest amount to be invested by any municipal sinking fund is one decided upon a few days ago, when the Sinking Fund Commissioners of Boston voted to purchase $1,000,000 worth of Liberty Bonds. It is believed that this is the first instance of any American city investing any such large amount of its sinking funds in these bonds, but it is to be hoped that it will not be the last. There certainly can be no safer investment for sinking funds, and the city by taking such action offers the best possible argument to its citizens for assisting in floating the loan.

UTILIZING GARBAGE.

With the duties which our entrance into the war has placed upon American citizens, both individuals and communities, the matter of disposal of municipal wastes takes on a somewhat new aspect, in that the arguments for utilization of these waste matters are increased by the additional one of the necessity of conserving all of the country's resources, and especially those of food.

In addition to the inducement of patriotism there is the further financial one that most of the products derivable from waste food matters have greatly increased in price, and therefore methods of utilizing garbage which formerly promised to yield little if any net returns now look much more attractive.

Returns from garbage are theoretically practicable by utilizing the heat created by burning it (when mixed with other and more combustible wastes), by treating it in plants which recover from it grease and tankage, by feeding to hogs, and by using directly as a fertilizer by plowing it into the ground. Promising as the figures have been made to appear, there seem to be very few plants where garbage and municipal wastes are burned in which the utilization of the heat created more than offsets or even equals the cost of operating the plant combined with overhead charges on the same.

Several cities have apparently realized a good net profit from the operation of reduction plants, but it is believed that such plants are so elaborate and expensive that they can be operated with profit only by the larger cities. Utilization of garbage by transforming it into pork by way of the trough requires small capital expenditure and,

when properly operated, seems to assure good returns, and these should be especially favorable with the present high price of pork and all the by-products of hog slaughtering. Municipalities, however, if they adopt disposal by hog raising, should insure that none of the pork so raised is diseased, and this will ordinarily require that the garbage be collected and fed before it has had an opportunity to begin putrefaction.

The above is suggested by the news that Minneapolis, Minn., is now considering the abandoning of its incinerating plant, and substituting for it either reduction or feeding to hogs. The city engineer, F. W. Cappelen, has reported that a municipal piggery, in which the pigs are fed upon the garbage of the city, would yield an annual profit of $70,000, whereas the present plant for burning garbage and refuse and using the heat for heating and lighting public buildings and streets is operated at a net loss. This movement is supported by citizens who object to the present central loading station, where the garbage is transferred from collecting wagons to railroad cars. Two propositions have been made to the city, one by a St. Paul firm which offers 50c. a ton for the garbage delivered on cars, providing a 3-year contract is given, or 55c. for a 5-year contract; while a Chicago firm offers to build a reduction plant outside the city and pay the city for the garbage a sum which has not been made public.

The Minneapolis incinerator has had the reputation of being one of the most efficiently operated plants of the kind in the country, but the demand of the entire world for fats and fat products and for fertilizers furnishes a weighty argument for the discontinuance of the plant, for the present at least, and the utilization of the garbage by one of the methods contemplated.

REMOVING ACTIVATED SLUDGE.

The following information concerning some recent experiments at the Milwaukee experimental sewage treatment plant has been kindly furnished by T. Chalkley Hatton, chief engineer of the Sewerage Commission of that city.

Several months ago the Milwaukee Sewerage Commission became impressed with the apparent necessity for using some different method for removing the settled activated sludge from the tanks which supplied the sludge presses. It was suggested that there be tried for this purpose an appliance known as the Dorr thickener.

It was then expected that the thin sludge from the sedimentation tanks could be pumped direct to the sludge tanks, in which it would settle, and the clarified liquor passing off would leave a settled sludge containing considerably less moisture to feed to the press; thus reducing the volume of mixed sludge and water to be treated by the press and correspondingly reducing the time of pressing.

After operating the thickener in a 10-foot diameter sludge tank for a number of months, the thickener was found to be of little advantage in giving a thicker sludge for the press, because time alone could eliminate the water, and the time required to reduce the moisture content from about 99 per cent to 96 per cent was from 4 to 6 hours, according to temperature and character of sludge removed from the sedimentation tanks.

The satisfactory manner in which the thickener continuously removed the settled sludge from the bottom of the tank to a central draw-off witout causing it to remix with the supernatant liquor, however, led to the belief that it could be successfully used in sedimentation tanks to continuously remove the settled sludge to a central draw-off pipe.

Whereupon a flat-bottom tank was erected, 13 feet in diameter and 10 feet effective depth, and a Dorr thickener placed within it, and this has been operating as a sedimentation tank for the aerated mixture of sludge and liquor as it flows from the aerating tanks.

This experiment has enabled the investigators to determine the maximum speed of the plows passing over the bottoms to prevent remixing of the settled sludge with the supernatant liquor, which appears to be 12 feet per minute at the periphery; and the maximum sedimentation per square foot of tank surface, which appears to run from 1,600 to 2,100 gallons per day per square foot of surface, which amount equals our best record for hopper type sedimentation tanks.

Should this apparatus prove as successful as it promises at present, it will overcome two very important objectionable features in the design and operation of the Milwaukee plant, viz.:

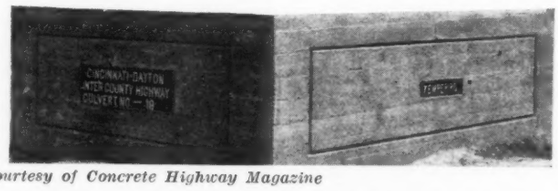
It will eliminate very deep hopper bottom tanks, which are very expensive to build at the Milwaukee site.

By removing the settled sludge surely and continuously it will eliminate the serious trouble which always has been found of the sludge collecting upon the steep slopes of the hopper type, becoming septic and absorbing the dissolved oxygen.

The Milwaukee experiments with hopper bottoms up to slopes of more than 60° have proved that the sludge does collect upon these slopes to such an extent that, unless frequently removed, there is less dissolved oxygen in the effluent than in the influent of the sedimentation tanks.

ROAD MARKERS.

In a recent issue of the *Concrete Highway Magazine*, Wm. H. Boeh, surveyor of Hamilton County, O., described a simple and cheap road marker made of concrete. The signs are placed on both of the inner sides of parapets of bridges and of culvert headwalls, where they extend sufficiently above the surface of the road. The signs give the name of the road, number of the structure, date of erection or such other information as may be desired. The accompanying view shows signs on a culvert on Kemper Road, Hamilton Co., O.



Courtesy of Concrete Highway Magazine

NAMEPLATE AND MARKER ON KEMPER ROAD.

The signs are made of number 12 gauge, 99.84 pure iron. The letters are milled to a depth of one-sixteenth of an inch, and after being galvanized are given a coat of aluminum paint, the balance of the plate being covered by two coats of paint baked. The signs are anchored into the concrete at the corners. The cost of such signs is small, as $1 per line of 15 letters or less may be used for the purpose of making estimates.

COLLECTING WASTE PAPER.

The Street Department of Charleston, S. C., early in 1916 came to an understanding with the Retail Merchants' Association of that city whereby the merchants of the city agreed to place all paper and similar refuse in bags to facilitate collection. The department purchased a specially constructed cart for collecting these bags. This system of collection is reported to have given very satisfactory results.

The WEEK'S NEWS

Baltimore's Cobblestones Eliminated—Wayne County, Mich., Celebrates More Concrete Roads—Maine's Sanitary Survey of Hotels—Health Expenditures in Connecticut Cities—Catskill Aqueduct Completion Celebrated by New York City—Denver's Water Bond Issue Held Up—Portsmouth and Norfolk, Va., Fight for Lakes—Savannah, Ga., Turns Down Water Bonds—Thermal Standard Allowed for New York's Gas—Big Fires in East St. Louis, New York, San Francisco and St. Paul—Celebrating Fire Prevention Day.

ROADS AND PAVEMENTS

Eliminating Cobblestones in Baltimore.

Baltimore, Md.—In the past five years the city has taken big strides in eliminating the old characteristic cobblestones. Now within the corporate limits of the 437 miles of streets and 145 miles of alleys, 344 miles of streets have been paved at an average cost of $50,000 per mile, or $16,200,000, and in the last two years 44 miles of alleys, varying in width from 4 to 20 feet. Those less than eight feet in width were paved with cement sidewalk construction. These alleys are private and were paved at the expense of the abutting property owners. Up to the beginning of 1912 the city had 350 miles of cobblestone streets and alleys, aggregating 5,000,000 square yards. Three commissions have charge of the work of repaving; the street paving commission has charge of all the streets within the city proper; the commission on the opening of new streets has charge of the paving in the annexed districts, and the state roads commission has charge of all state roads, even when they terminate in the heart of Baltimore city. The best pavement applicable to the conditions of traffic in each case is put down. The various kinds of materials include bituminous concrete, asphalt block, vitrified brick, creosoted wood block, and in the cases of some of the country roads asphalt-coated macadam. The movement for better streets began in 1911, when two loans were authorized, one of $5,000,000, to be expended in paving generally, and the other, of $2,500,000, to be used exclusively in the annexed section of the city.

Wayne County Celebrates New Concrete Road.

Detroit, Mich.—The citizens and civic organizations of the city and Wayne county celebrated Good Roads day on October 11 to mark the completion of the Northville Road of the "Outer Belt Drive" of the county's concrete highway system. Thousands of out-of-town guests took part in the celebration including governor Sleeper and his staff and good roads boosters and officials from nearby states and from across the Canadian border. The local automobile companies furnished music and helped in carrying out the plans for the event. The dedication ceremony was impressive. President William E. Metzger and attorney-general Alex. J. Groesbeck wielded shears on a huge banner stretched across the road, symbolizing the removal of bad roads from Wayne county. The banner bore the following inscription: "Wayne County—Bad Roads—Wayne County." When "Bad Roads" was cut from the banner, governor Albert E. Sleeper, with a gold and silver spade, removed from the concrete the last shovelful of dirt. The christening followed, and music, speeches, luncheon and a huge automobile parade concluded the festivities. Wayne county was acclaimed the pioneer in building concrete roads. The season's work amounts to 165 miles, and stretches of brick and asphalt were also constructed. During the year the county road commission spent $400,000, making a total of $3,500,000 since the commission was organized. The original schedule on which the commission has been working—and there has been no change in the general scheme in all these years—will not be completed for some time. Concrete trunk lines on all of the arteries, outer, middle inner belts, are in the plan. The increase in the cost of materials and construction are so much greater than that of the appropriations that a smaller mileage has been necessitated. "During the year we have hired 1,600 men in an endeavor to find 400 who can and will do the work," said Edward N. Hines, chairman of the road commission. "The labor problem has been acute, it has hampered us and the future is none too bright." The commission is now using granite or trap rock for surfacing, as these materials are more durable, but they cost 100 per cent more than the material formerly used. Woodward avenue from the Highland Park limits to the county line is claimed one of the heaviest traveled roads in the world, figured on the basis of width. In 10 hours, during which count was kept, 11,044 vehicles passed along the Woodward avenue road, which is but 18 feet wide.

Land Condemnation for Street Widening Takes Five Years.

New York, N. Y.—Except for the ordering of a number of corrections, justice Scudder in the supreme court has confirmed the report of the Condemnation Commissioners on the Queens Boulevard improvement, after the lapse of nearly five years since the commissioners were appointed. By the time the corrections are made five years will have been consumed by the commissioners. The awards, including interest to November 16, 1916, amount to $4,044,558.41. On June 25, 1915, the supreme court allowed a bill of costs amounting to $52,456.89, and in May of this year the commissioners were allowed to tax an additional bill of $25,712.81. The commissioners condemned 789 parcels and will receive something more than $3,000 each for their services. This proceeding to open and widen Queens Boulevard has been the cause of considerable strife and a vast amount of litigation. As a result of the delay in paying the owners, the city will have an interest bill of much more than $500,000, most of which, however, is included in the $4,044,558.41. It is estimated, however, that the interest which has piled up since the date of the final report, November 13, 1916, will amount to almost $200,000. Of the assessments, 20 per cent will fall on the local area, the Borough of Queens will pay 30 per cent and the city at large the other 50.

SEWERAGE AND SANITATION

Navy Secretary Asks Sanitary Improvements.

Charleston, W. Va.—Secretary of the Navy Daniels has written a letter to mayor MacQueen in regard to the sanitary conditions of the city. The secretary refers to a report made by the United States public health service, and asks that steps be taken to carry out the suggestions embodied in that report. The importance of the health of the city of Charleston in regard to the work to be done at the new government plants is impressed very firmly. Mayor MacQueen says that many of the recommendations had been anticipated, and that much had been done in the last few months to improve the sanitary condition of the city. The health department has been put on a firm footing, said the mayor and the salary of the health commissioner has been doubled, so that the commissioner can afford to give more time to the work. A dairy inspector and a visiting nurse have been appointed lately and are now at work. The water company has complied with recommendations in the secretary's letter. According to the health commissioner, hundreds of surface privies have been covered during the last few months. With the proper funds at hand, the mayor is confident that

the city's sanitary condition will meet with the approval of the government experts. Among the recommendations are the following: 1. "Water Supply—That any contract with the West Virginia water and electric company for water supply provide that the water to be furnished comply with existing standards of purity for water supplied to railroad trains in interstate traffic, as laid down by the treasury department. That this contract provide also for the immediate installation of such filter units at the filtration plant as are necessary to provide the supply to be delivered." 2. "Health Administration—That the department recommend to the city of Charleston that the health department be immediately reorganized in such manner as to provide for active and effective sanitary administration." 3. "Control of Surrounding Territory—That, in the event that annexation of the territory surrounding the plant to the city of Charleston be unduly delayed arrangements be made with the city of Charleston and the county of Kanawha for joint supervision of sanitation in this territory for the sewering and abolition of all surface privies within one mile of the plant." 4. "Housing—That the absence of proper housing in the city or its immediate environment at this time be given serious consideration and that plans for the systematic and satisfactory housing of the employees of the navy department be worked out." The secretary says: "It appears from the report that there is room for improvement in some of the things which have come to be looked upon by progressive communities as fundamental principles underlying successful municipal sanitation; notably an efficient health department, a sufficient and safe water supply, proper disposal of sewage and garbage, and prompt reports of communicable diseases with municipal control." The mayor has sent copies of the secretary's letter to the water company, the county officials and the chamber of commerce.

Sanitary Survey of Maine Hotels.

Augusta, Me.—During the past month the new state department of health of Maine has been engaged in making a sanitary survey of the hotels and summer resorts. This work, which is being done with the full co-operation of the Maine Hotel association and the hotel men individually, has been very gratifying to the department in showing that sanitary conditions are well cared for and the Maine hotel men are anxious to do everything possible for the welfare and comfort of their guests. A letter has recently been sent to the members of the hotel association by the secretary, Wilbur T. Emerson, setting forth the nature of the work and its potential advantages. Up to the present time the survey has included only those hotels along the coast, but during the next few months many of the inland vacation hotels and commercial houses will be visited. Data is being collected at each hotel upon the location and condition of the building, the storage and handling of food, the water and milk supplies, sewage and garbage disposal, toilet facilities, plumbing, and the adequacy of employees' quarters. This data will be considered during the annual meeting of the hotel association in December at a conference with the health authorities and it is expected that plans will be made for continued and regular hotel inspection. The survey is being made under the direction of the health commissioner, Dr. L. D. Bristol, by C. E. Turner, who is an instructor in the department of biology and public health at the Massachusetts Institute of Technology and in the Harvard-Technology school for health officers.

Health Expenditures Too Low.

Hartford, Conn.—In the recent bulletin of the state health department, health commissioner John T. Black has a vigorous article headed, "How Much Does Your Town Pay?" It says: "Health officers' reports last year show that the smaller towns of the state are paying out very small sums for the protection of their health. At the present time most towns are working on their annual budget and they should seriously consider the amount to be allotted for health. If the town has a death rate of nine per thousand or less, if the records show no deaths from tuberculosis or other preventable diseases, if not more than 5 per cent of the babies born have died and if the school attendance has been 98 per cent perfect, the amount expended last year will probably be ample for the coming year. The above standard is possible and has been reached, but not in Connecticut. It means that any community reaching this standard is saving its citizens thousands of dollars a year at a comparatively small expenditure. A good health officer can guarantee his town officials to save a life with every $500 placed at his disposal, and a well trained health officer can accomplish the same result with $200. The state department of health has been working on a 2 cent per capita basis—this coming year it will have a little over 4 cents but it should have 8 or 10 cents to properly serve the state. From the health officers' reports last year the following per capita expenditures were tabulated, to which we have added the amount we think necessary to expend to properly protect the health.

AVERAGE PER CAPITA EXPENDITURES, 1916.

For Health.	Expended.	Advised.
Cities of over 50,000 pop.....	.40	.65
Cities of 25 to 50,000 pop.....	.136	.50
Cities of 15 to 25,000 pop.....	.13	.40
Cities of 10 to 15,000 pop.....	.075	.30
Towns of 5 to 10,000 pop.....	.07	.25
Towns under 5,000 pop.....	.045	.20

This shows that many towns have not spent enough money for health to buy each person a cheap cigar or a bag of peanuts."

New Sanitary Code.

Lancaster, O.—The new sanitary code recently adopted by the board of health when properly put into operation is expected to mark a new era in the sanitary condition of the city and to do much to protect the health of its citizens. The new code will provide for the inspection of the milk sold in the city. Milk dealers must obtain a permit from the health department before selling milk in the city. Under the new code there will be a better observation of the foods sold in the city and closer observation on hotels, restaurants, bakeries and those who deal i vegetables and fruits. The new code provides for the abandoning of out closets as rapidly as possible where sewer connections are available. The new code will have a closer enforcement of the quarantine laws on communicable diseases. The diseases added under the code for quarantine are whooping cough, measles and chickenpox. The new code provides for a sanitary police officer.

Public Health Nurses Around Army Camps.

Washington, D. C.—Fifty public health nurses have been assigned for duty by the American Red Cross to the zones around the National Army cantonments, National Guard camps, and naval bases. The nurses will work under the Red Cross sanitary directors in co-operation with the local, state and federal health authorities. Nurses have already taken up their work in civil districts around the cantonments at Hattiesburg, Miss.; Fort Riley, Kans.; Des Moines, Iowa; Louisville, Ky.; Little Rock, Ark.; Ayer, Mass.; Chillicothe, Ohio; Atlanta, Ga.; Newport News and Petersburg, Va. As visiting nurses in the rural territory and cities adjoining the camps, the Red Cross nurses assigned to public health work will endeavor to prevent the spread of tuberculosis, malaria, and social diseases, and to strengthen the local infant-welfare programs. Nurses have been chosen for this service by Miss Jane A. Delano, chairman of the National Committee on Red Cross Nursing, with special reference to the public health needs of the nation as a whole. If the public health nursing service of the state in which the cantonment is situated is strong in numbers the Red Cross has called upon nurses from that state. Otherwise, nurses have been chosen from the states from which the troops in training have been drawn. A permanent Red Cross public health service will undoubtedly be the outcome of the work now being undertaken in Army districts. Besides the special work in camp zones, Red Cross nurses in the Town and Country Nursing Service are at work through-

out the country, largely in rural and mining communities. Ninety-four women are so engaged in nursing and teaching the care and feeding of infants, first aid and home dietetics, and assisting the fight against tuberculosis. It has been estimated that 48 per cent of the Union troops in the Civil War came from the country districts. While the percentage will not be so large in this war, the Red Cross has undertaken to see that their families and homes are kept well and safe against the day of the country soldier's return.

WATER SUPPLY

To Begin Work on Otay Dam.

San Diego, Cal.—The council's action in awarding a contract to James Kennedy means that work on the Lower Otay dam will begin as soon as Kennedy can assemble his working forces. The contract requires that Kennedy furnish a bond in the sum of $300,000 to protect material dealers and labor and one in the sum of $150,000 for faithful performance of contract. The council came to a conclusion that the Kennedy bid of $586,732 was the best bargain the city could make, following a heated discussion. The council's action came after a statement and a written agreement by Blymeyer & Co., San Francisco, purchasers of the $682,200 bonds for the improvement that they would waive the opinion of Dillon, Thomson & Clay, the New York firm of bond attorneys, as to the validity of the bonds, saying they would take them as they are. So bitter were some of the councilmen against Spitzer, Rorick & Co., for failure of that firm to take the Otay bonds that councilman Bacon introduced a resolution directing the city attorney to legally proceed against the Toledo bond firm to collect $28,000, the amount of the premium offered, and the accrued interest, by that firm when it bid on the bonds; also to be included damages of $1,000 a day from the time Spitzer, Rorick & Co. refused to take the bonds. This resolution failed to carry. The council directed the clerk to hold a certified check of $6,822 deposited by Spitzer, Rorick & Co. for faithful performance of contract to take the bonds. Blymeyer & Co. bid $586,000, which was accepted.

New York Celebrates Catskill Aqueduct.

New York, N. Y.—With a pageant, concerts, speeches, dinners, medals and exhibitions, New York has celebrated the completion of the Catskill aqueduct. Mayor Mitchel on behalf of the city formally accepted the complete system at exercises in the aldermanic chamber at the city hall. He described the work as a feat of engineering which approached the building of the Panama Canal in magnitude and exceeded it in difficulty. Mayor Mitchel bestowed upon ex-mayor George B. McClellan the chief credit for conceiving and driving through the project for a vast supply of pure water for New York City, and named J. Waldo Smith, the chief engineer of the Board of Water Supply, as the man to whom most praise was due for conquering difficulties which had never before been faced by engineers. On behalf of the city he thanked the enginers under Mr. Smith and the contractors who had worked on the water system for completing it ahead of time, at about $7,000,000 less than the estimated cost and without the suggestion of a hitch or of scandal. Then mayor Mitchel accepted from an unknown donor the jet fountain in Central Park in the afternoon and officially turned on the Catskill water, which leaped from the fountain to a height of eighty feet, while about 2,000 persons cheered. Fifteen thousand school children took part in the pageant entitled "The Good Gift of Water," written for the occasion by Dr. Edward Hagaman Hall. An exhibition of Hudson River pictures is being shown as a part of the aqueduct celebration in the Metropolitan Museum of Art. Medals for distinguished service in creating the Catskill water system were presented at the dinner given by the mayor's committee to mayor Mitchel, ex-mayor George B. McClellan, chief engineer J. Waldo Smith, Charles Strauss, president of the Board of Water Supply; Charles Noyes Chadwick, a member of the board from its inception; John F. Galvin of the Board of Water Supply; Charles A. Shaw, an ex-member of the board and to the family of the late J. Edward Simmons. This gigantic work of engineering and construction is finished after ten years labor. After the dry years of 1895 and 1896 the danger of a water famine was thoroughly realized. Then began the term of protracted debate and experimentation which ended with the acceptance of the prodigious plan of water supply. Commissioners were appointed by mayor McClellan in June, 1905, and J. Waldo Smith was named chief engineer, a position he still holds, in August of that year. An experimental shaft was sunk at the Storm King end of the Hudson River siphon in February, 1907, and actual work of constructing the aqueduct was begun in June of that year. It has cost $140,000,000, and there has been no waste. It has not been delayed by labor strikes or accidents. The dam at Ashokan is in many ways the greatest structure of its kind in the world. The immense lake which forms the chief reservoir was made by flooding 15,000 acres of land. Nine villages, with many outlying farms, inns, schools, and churches, were removed. All property confiscated was paid for. Eleven miles of the tracks of the Ulster & Delaware Railroad were relocated. No fewer than thirty-two cemeteries were removed. In a separate reservoir near the dam the water is aerated. From its surface the water rises in many jets from forty to sixty feet, falling in the form of spray. The aeration plant is surrounded by trees and flowers, and the whole region, comprising 257 square miles, has been beautifully transformed. North of the Ashokan reservoir, which taps the Esopus watershed, they are constructing now the new works of the Schoharie watershed, which will supplement the Esopus supply. Each of these related systems will supply a minimum daily flow of 250,000,000 gallons. The available reserve capacity of the Ashokan reservoir alone is 128,000,000,000 gallons. From this reservoir the water is sent by gravity ninety-two miles to the city's northern boundary. The Kensico reservoir, with its capacity of 29,000,000,000 gallons, a supply for the city for two months, and the Hill View reservoir at Yonkers are two important parts of the great work and the flow continues, through conduits and pipes, by way of river tunnels and one under the Narrows, to all the boroughs and to Silver Lake reservoir on Staten Island, the terminal, 120 miles from Ashokan.

Seek to Restrain $8,000,000 Bond Issue.

Denver, Colo.—The question of municipal ownership of the water supply of the city is involved in the suit of Clara A. Wheeler and Frank S. Lusk, seeking to restrain the city of Denver from the issuance of $8,000,000 bonds for the construction of a city water plant and seeking to restrain the city from enforcing an ordinance requiring a twenty per cent reduction in water rates charged by the Denver Union Water Company. The suit was filed June 1, 1911, and dismissed by judge Robert E. Lewis, in federal district court, on the ground that collusion existed between the water company and the plaintiffs. The case was appealed by the company, in whose behalf the plaintiffs were suing, to the United States supreme court, where the case was ordered back to the local court on the ground that the trial judge was in error. In the meantime, however, another case, known as the franchise case, had been decided in Washington, covering virtually the same points included in the Wheeler-Lusk suit. The franchise suit contested the right of the water company to use the streets of Denver. When the Wheeler-Lusk case was brought up in federal court here again, an amended petition was filed, touching upon other points not covered in the franchise case decision. Judge Lewis, however, again dismissed the suit and it was taken into the circuit court of appeals where judge Lewis' decision was upheld. The plaintiffs then appealed again to the supreme court. The city's next move was to file a motion in the United States supreme court to dismiss the suit, on the ground that the plaintiffs, after appealing to the circuit court of appeals, had no right to carry the case to the supreme court. In 1914 the city passed an ordinance requiring the horizontal reduction of twenty per cent in water rates charged by the Denver Union Water company. Judge Lewis issued a temporary restraining order which he later made permanent, after a valuation of the

company's properties had been made, by W. J. Chinn, of Colorado Springs, appointed by the court as special master in chancery. Mr. Chinn's report gave the valuation at $13,459,000. Since the case has been appealed the water company has given the city an option to purchase the system at a price to be fixed by special master Chinn, plus any additions and betterments made since that time. The company also had agreed to be bound by any price to which the United States supreme court may reduce the present valuation. City officials have agreed to hold an election within a year following the high court's decision in which the people shall vote upon the purchase of the water plant at a price yet to be determined. In its brief the city puts the valuation of the company at $4,000,000.

Cities Fight for Lake Water Supplies.

Portsmouth, Va.—City attorney Happer, following instructions by the city council, has filed in the Court of Hustings a petition for an injunction to restrain the city of Norfolk from acquiring from the Portsmouth, Berkley and Suffolk Water Company, Lakes Phillips and Burnt Mills. The court is also asked by petition to enjoin the Portsmouth, Berkley and Suffolk Water Company, by its president, from executing a deed to the property. The petition also asks that Norfolk be restrained from taking up the deed, and that B. Gray Tunstall, its treasurer, be restrained from making payment for the property. The petition affirms that all of the four lakes owned by the Portsmouth, Berkley and Suffolk Water Company—Kilby, Cahoon, Phillips and Burnt Mills—are needed to meet the growing demands of the city of Portsmouth, and of the United States government. It affirms that should the sale be consummated the city of Portsmouth and the United States government will be denied an adequate supply of water, as Kilby and Cahoon lakes are insufficient for that purpose. It charges that the sale is in violation of the contract between the water company and the city, whereby the city is given the right at the expiration of the present contract, in April next, to take over the water company's holdings, and is also in violation of acts of assembly. It is charged that the acts of defendants in the premises affect rights which cannot be compensated in damages. At a meeting of the Portsmouth Council, city manager Bates declared that he has received a communication from Dr. George B. Young, of the United States public health service, in which the health officer states that the source of the city's water is adequate for present needs, but is not capable of being greatly expanded. He also called attention to the fact that the navy yard in May, 1916, used 8,000,000 gallons and in August, 1917, the plant used over 22,000,000 gallons of water.

Norfolk, Va.—The move to acquire the lakes for $100,000 is considered by the Norfolk board of aldermen as a successful end to the efforts of many years of the city to secure an adequate water supply. "The water question is solved for years to come," declared president J. C. Prince, chairman of the water committee, which conducted the negotiations. "The city of Norfolk now has Burnt Mills lake and Lake Phillips, and nothing short of a foreign invasion can take them away," declared city attorney Pilcher, who conducted the legal phase of the fight. Lake Phillips is in Nansemond county and Burnt Mills lake is in Isle of Wight county. Burnt Mills is the larger lake of the two, and furnishes the larger supply of water, the two together having an estimated capacity of 30,000,000 gallons per day, sufficient to supply a population of 250,000 persons. The present water supply of the city of Norfolk is 10,000,000 gallons per day, sufficient to supply 150,000 persons, so that the water supply sources of the city, developed and undeveloped, are sufficient to supply a population of 400,000 persons and manufacturing plants and industries in large numbers. Both because of the cost of material and the scarcity of labor and because the extra supply is not yet needed, the work of development will not be undertaken now or in the near future. The city of Norfolk is at present using not more than 6,000,000 gallons daily and has a supply of 10,000,000 gallons. The latest and final campaign to give Norfolk water supply adequate to future needs and necessary to the city's growth commercially and in population began last autumn, with the adoption of a resolution authorizing the city attorney to institute proceedings in condemnation. As required by law, efforts were made by negotations to secure from the Portsmouth, Berkley & Suffolk Water Company a price at which the lakes could be purchased. The company refused to set a price even as a basis for negotiations, and the city attorney filed proceedings in the circuit court of Nansemond county. JudgeMcLemore decided that too long a time had elapsed since negotiations had failed between the time of attempting to negotiate with the company and that of filing the petition for condemnaton of the property and suggested that the negotiations be renewed. This was done and this time the Portsmouth, Berkley & Suffolk Water Company indicated willingness to discuss terms of sale without waiting for condemnation proceedings. A conference between the board of control, the water committee of the council, city engineer Taylor and city attorney Pilcher on the one hand and officials of the company on the other followed, taking place in August. Another conference was later held in New York, and there an option for the purchase of the lakes was signed, president Prince having been authorized to reach such agreement. The option price was $100,000.

$500,000 Water Bond Issue Defeated.

Savannah, Ga.—The bond issue for the expenditure of $500,000 for the rehabilitation of the waterworks was defeated by a vote of 413 against 376, only 789 votes being cast out of a total registration of 1,702. The affirmative side needed 1,134 votes to win. After the election mayor Pierpont said the plant would be improved from time to time as funds permitted. The indifference of the administration, the uncertainty as to what body would have control of the expenditure of the money, the lack of a definite understanding regarding the method of doing the work and the conflicting interviews on the subject given out by the mayor were ascribed as the chief reasons for the adverse vote. The issue was to have been divided into one thousand bonds of $500 each face value, to be payable within twenty-five years from their date, to bear interest at the rate of 4½ per cent per annum, interest being paid semi-annually. The bonds were to have been paid and retired as follows: "By the expiration of the first year of their life $2,000 face value of said bonds shall be paid and retired, and each and every year thereafter an increase of $1,500 face value of bonds over and above the previous amount of bonds retired shall be paid and retired, that is to say, the second annual payment shall include and retire bonds of the face value of $3,500, the third annual payment shall include and retire bonds of the face value of $5,000, and so on, the payments adding each year $1,500 of the face value of bonds to the number last paid and retired, thus retiring all of the bonds by their maturity." A sinking fund was to have been established for the purpose of carrying out this plan of payment.

Plan Big Flood Water Storage Project.

Albany, N. Y.—At a conference of representatives of the principal cities in the Hudson valley, which was held in the office of mayor Stevens in this city, the proposed plan for the storage flood waters of the Hudson valley was adopted. The plan calls for an immense dam at Conklingville which would create a lake the size of Lake George, fully 30 miles long, and covering the valley of the Sacandaga well up into the mountains. It would bring what is now Sacandaga park completely under water, and would also inundate the present location of Northville. The conference was attended by mayor Stevens, corporation counsel Andrews and president J. Y. Read of the Albany Chamber of Commerce, representing Albany; mayor Burns, of Troy, and president Cluett, of the Troy Chamber of Commerce, representing Troy; president Imrie of the Glens Falls Chamber of Commerce, and representatives from Mechanicville, Hudson Falls, Fort Edward and Castleton. George N. Ostrander, of Albany, and Frank L. Bell and J. Elmer West, of Glens Falls, representing the power owners of the upper Hudson river, were also present and stated

that the power owners would be willing to bear 95 per cent. of the cost of construction. The conference was called together by mayor Stevens under the provisions of section 662 of the laws of 1915, creating the state commission for the control of storage water. This commission consists of the state conservation commissioner, attorney general and state engineer. It was decided to petition the state commission at once. It will then be the duty of the state commission to apply to the governor for the appointment of a local commission composed of residents of the district to be benefited. The cost of the proposed work would be $6,000,000. The plan calls for a storage and control of one-third of the total flood waters of the Hudson river.

STREET LIGHTING AND POWER

New White Way Opened.

Pine Bluff, Ark.—Pine Bluff's new street lighting system is now the pride of the town. The city took on "metropolitan airs" when mayor Simon Bloom threw a switch which turned the current into the new system installed throughout the business and residence sections of the city. The inauguration of the new lighting system was made the occasion for an appropriate celebration by city officials, the lighting company, civic associations and citizens in general. The new lighting system consists of 106 ornamental posts instead of the 56 posts formerly used, while the illumination will be furnished by one light of 250 candle power to each post instead of four lights of 50 candle power each per post under the old system. Under the new system there are four poles with one light each along each side of the block, at uniform distances. This change is in the business section of the city, while the residence portion of the city will be illuminated with 473 incandescent lights of 60 candle power instead of the 32 candle power lights formerly used. The members of the water and light committee, together with mayor Bloom, began negotiations with the Pine Bluff company some months ago and reached an agreement which was endorsed by the city council. Under the new system the city receives about 100 per cent increased efficiency of lighting service at an increase of about 20 per cent in cost. The cost is now borne by the city while the former lights in the business district were paid for by the business men who cared to have a pole erected.

Heat Standard for New York Gas.

New York, N. Y.—The public service commission has issued an order granting the recent application of the gas companies of the city to change the standard unit from candlepower to British thermal heat unit. The commission took the action to permit the companies to produce to a much larger extent the by-product "TNT," which the government needs in the manufacture of munitions. The commission did not recede, however, from its position that consumers who have been supplied with gas of more than 585 units of heat per cubic foot shall not suffer by the change. Tests by experts of the commission show that the average of heat units supplied under the present 22-candlepower standard is 659. The order provides that the companies shall make a rebate to all consumers in proportion to the monthly average of heat units supply below 650. This would make the charge on gas of 585 units, suggested by counsel for the companies, 70 cents a thousand cubic feet, a reduction of 10 cents from the existing scale. Commissioner Travis H. Whitney said the amount rebated to the consumers might well figure in the cost of producing the by-product "TNT." He said it seemed certain the government would have no objection to such a method of computing the cost. This means that the government and not the companies would pay the rebates to the consumers. At the hearings before the commission, Dr. Charles H. Herty, former President of the New York Society of Chemists, advocated the change. The changing of the gas valuing method from the illumination standard to the heat standard was previously pressed because it would cheapen the manufacture of gas, and because the use of a cheaper oil would produce more toluol. Dr. Herty said that he had talked with General Crozier, Chief of Ordnance, U. S. A., who had told him it was necessary to get all of the toluol possible for use in the war, not only by the United States, but by Great Britain. He had said "that if all the toluol of every one of the gas companies was available, the total would be only 150,000,000 pounds for a year, or about half of the amount needed for operations based on 1,000,000 fighting men." The witness, in reply to a question, admitted that the government had arranged to insure the gas companies against all risks attached to a change in plant made necessary in getting out the greatest quantity of toluol. Chairman Straus and commissioner Hervey maintained that the consumer should profit as well as the company by any cheapening of the manufacture of gas through a change of standards. William N. Dykman, counsel for the Brooklyn Union Gas Company, said that his company was not earning 4 per cent. on its investment and that if the price of gas should be put into the question long litigation would face the commission. In the meantime the government would suffer, he said. Robert A. Carter, for the Consolidated Gas company, indorsed the stand taken by Mr. Dykman, and said the Consolidated company was now selling gas at 80 cents a thousand feet that was worth 95 cents.

Electric Light Rates Reduced.

Fort Worth, Tex.—Electric light consumers in Fort Worth are to be saved approximately $50,000 annually as the result of a reduction secured in the light rates by mayor W. D. Davis and light commissioner Selwin Smith. Not only is the saving effected for the consumers, but the new contract with the Fort Worth Light & Power Company makes it very probable that the all-night street lighting system will be inaugurated by the city within a short time at practically no added cost. At this time the city is operating the street lights on a moonlight schedule. Mayor Davis and commissioner Smith have been working for the reduction for some time. The minimum rate of 50 cents remains in force. On and after Nov. 1 the charge per kilowatt hour will be 6 cents and 8 cents, whereas before it has been 6 cents and 10 cents. This, according to estimates made by commissioner Smith, will amount to a total net reduction of 20 per cent. to both domestic and commercial users.

Eight Per Cent Considered "Fair Return."

St. Louis, Mo.—James D. Mortimer, of New York, president of the Union Electric Light and Power Co., testifying before the state public service commission declared that he considered a net return of 8 per cent on money invested in a public utility such as the Union Electric, a necessary and fair return. At the same time, he testified that it has become very difficult to attract new capital to public utilities corporations, that their securities have come to be regarded as semi-hazardous, and that regulation has discouraged investment in such corporations. He added that practically the only method by which the Union Electric can obtain new capital is by the sale of its 7 per cent preferred stock to customers, of which $1,000,000 was offered a short time ago. The hearing was in connection with the complaint of the Engineers' Incitation Club, of St. Louis, that the company's rates are excessive and discriminatory. The complaint was filed two years ago and the hearings have been continued from time to time. Officials of the company presented their estimate of approximately $34,000,000 as the reproduction cost of the corporation, including valuation of physical and intangible assets. The engineer for the public service commission several months ago made an appraisal fixing the physical valuation at $22,757,000. It is the contention of the Engineers' Incitation Club, represented by attorney William F. Woerner, a former member of the state public service commission, that the rates of the company are based on an excessive valuation and the public service commission is being asked to fix a reasonable valuation upon which the company should be allowed to earn a fair return. Elaborating upon this idea of a fair return, Mortimer said it should be determined by what it cost to attract new capital to the concern. This cost, under present conditions, he said, was not less than 8 per cent, as follows: 6 per cent for interest and about 2

per cent for promotion fees, advertising, broker's commissions and other items. The $1,000,000 of preferred stock being offered to the customers of the company bears 7 per cent interest, and is being sold directly by officers of the Union Electric. Mortimer also testified that he considered it necessary for a public utility to receive a gross annual revenue of from 40 to 50 per cent of its invested capital in order to pay a net return of about 8 per cent. He gave as a reason for this the nature of the investment, the high operating expenses in proportion to the investment, and the immobility of the capital. Voluminous testimony in the nature of briefs made by various officials of the company was introduced in substantiation of the company's own appraisal of its reproduction cost. These briefs went into detail and criticised many items of the physical valuation as fixed by the commission's engineer. It was testified by Union Electric officials that the company's profits since 1913 were as follows: 1913, $1,791,327.31; 1914, $1,766,813.08; 1915, $1,707,939.50; 1916, $1,589,113.84; six months, 1917, $711,474.44.

FIRE AND POLICE

Big Elevator Fire.

East St. Louis, Ill.—Fire, supposed to be of incendiary origin, destroyed the Acme elevator and adjacent warehouses with an estimated loss of $235,000, of which $35,000 is on the buildings and $200,000 on the contents. Near the elevator are three big packing plants, but fortunately only a light wind was blowing and the flames did not spread to these big industries. The fire was discovered by a negro watchman, the only employe of the elevator company on the premises. He said that when first seen the fire was at the south end of the main building. Switchmen for the Terminal Railroad Company, the tracks of which serve the elevator, are quoted as saying the flames broke out in three parts of the structure at about the same time. Three cars of oats had been loaded day before and were standing on a service track. A terminal engine got one of these cars out before it was damaged, but the two others were destroyed. Chief Tobin had all of the fire companies except one at the fire, but there was little to be done except to keep the flames from spreading and try to save some of the sacked grain in outlying warehouses.

$2,000,000 Grain Stored for Allies Burned.

New York, N. Y.—Hundreds of thousands of bushels of grain destined for consumption in the United States and in Allied countries were destroyed in a spectacular fire of undetermined origin in Dow's Stores, part of the property owned by the New York Dock company, at the East River, Brooklyn. Suspicion that an incendiary may have caused the fire led both fire chief John F. Kenlon and fire marshal Thomas Brophy to announce that its origin will be further investigated. Chief Kenlon, who characterized the destruction of all to scarce grain as the worst fire in the city since the old Equitable Building burned down, denied that the fire resulted from a dust explosion, as Marshal Brophy had suggested, and added that the fact that there had been three times as many waterfront fires as normally since the United States entered the war has convinced him that they cannot all have occurred from natural causes. Marshal Brophy said that the examination of many witnesses failed to reveal the fact that the explosions and the resulting flames were of an incendiary origin. He based his opinion, he said, chiefly on the testimony of four men who were in tower No. 2, one of the three great towers in the warehouse where the flames started. According to their story, the men smelled rubber burning and observed bluish smoke coming from a nearby shaft. Then they shut off all the machinery in their tower, which was nearest to the river. In two minutes they heard an explosion and saw flames. As they were hurrying to the street below they heard another explosion. Despite the efforts of firemen from every part of Brooklyn, assistd by several companies from Manhattan and by three fire patrol boats, it became apparent that the entire square block would be in ruins before the leaping flames were extinguished. A brisk southeast wind kept the flames bursting into the air all the afternoon and evening. The lives of the firemen were in danger all day as the red-hot brick walls would crumble and fall to the ground. Early in the morning the first tower tumbled; by 2 o'clock in the afternoon the second had fallen, and by 5 o'clock the third was in ruins. Chief Kenlon said he would have lost forty or fifty of his men when the first tower fell if they had not been ordered to leave when it was seen that the fight was hopeless. Three lines of hose were lost. When the second tower was toppling men from companies 202, 207 and 224 were near the roof. The wind blew sparks into their faces, and they, too, retreated just in time to save their lives. Captain Michael Manning, of Engine Company 224, is in hospital, seriously hurt. He was pinned under a girder when the first tower fell. Captain Lyons, of Engine Company 66, was also hurt, getting a fractured wrist and face burns. Owen Ward, a fireman of Truck Company 204, was also taken to the hospital seriously injured. "Since the war started," chief Kenlon said, "we have had twice as much work in the fire department as normally, and yet draft officials have taken away 300 of our men, and altogether, I believe, 500 are eligible. In these days, when important shipments of war materials are leaving the city, the strength of the fire department should be augmented instead of sapped. There have been fifty-six ship fires here within a year, and waterfront fires are suspiciously frequent."

Celebrating Fire Prevention Day.

New York, N. Y.—Fire Prevention Day was celebrated by a parade arranged by commissioner Adamson. It was a spectacular success, in spite of the fact that it was held in a slight rain. There were eighteen floats portraying strikingly preventable fire causes. One was a gigantic cigarette, with a text stating that carelessness with cigarettes had cost $444,032 last year and urging smokers to be careful in throwing away lighted butts. A float represented children playing with matches, and stated that this amusement for children had cost $103,380 last year. A placard on the float read: "How fires affect the families. Every family of five pays $12.50 a year fire tax. Practice fire prevention. Save cash." Washington Irving high school was represented in the parade by a float on which pretty girls rode. The text on each side of this read: "Education helps the city to conquer fires." A large sign carried by hook and ladder truck 5 read: "Three-quarters of our fires are caused by carelessness. Two thousand lives are lost each year and 6,000 persons are injured in fires. We spend $415 a minute for fire waste. Fire prevention would stop this needless drain on our resources." In the parade were a number of fire engines, hose wagons, and hook and ladder trucks, some of them carrying the following injunctions: "Clean up rubbish," Be careful with matches," "Overhaul your wires," "We can put out fires better today than ever, but it costs money. Why have fires to put out?" Thousands of red placards calling attention to the day were posted broadcast over the city by street railway companies, department stores, restaurants, banks, and other commercial and civic organizations who have responded generously to the commissioner's appeal for assistance in the observance of the day. Special exercises were held in all the public schools and in the parochial schools of New York and Brooklyn. These included a fire drill, the children marching out of every school in the city at a concerted hour. Thousands of circular letters addressed to citizens urging the necessity and pointing out the means of fire prevention were distributed. Settlements and philanthropic organizations distributed fire prevention "Don'ts" in English and Yiddish. Commissioner Adamson felt that the day was a landmark of the great progress made in fire prevention in New York during the past few years. The Bureau of Fire Prevention was organized in 1912. During the five years from 1912 through 1916 there was an annual average reduction of $1,581,916 in the city's fire loss. In other words, in five years the city was saved the substantial sum of $7,909,582. The record during the past three years has been even better, the average fire loss being $2,000,000 less than in the preceding three years and the average annual number of fires in buildings 1,000 less. The great feature of fire prevention activity during

the past year has been the work done in making factories safer. In October, 1916, the enforcement of the exit and occupancy law for factories was transferred from the state department of labor to the fire department. It is estimated that there was approximately 12,000 factory buildings in the city. From the beginning of the year to September 18, the fire department has made complete surveys of 3,900 of these factory buildings and by the first half of the year upwards of 15,000 violations had been noted. The great mass of work involved in the enforcement of the labor law had to be done by the fire department without an increase of force or additional funds. Commissioner Adamson did it by using New York's uniformed firemen. Every commander of the 301 fire companies in the city was made responsible for the factory buildings in his district. In districts where there were an unusually large number of factories, the work was done by a Central Building inspection squad composed of forty firemen selected for their knowledge of the law and of building construction. This squad made 510 complete surveys from July 20 to September 8.

Newark, N. J.—"Carelessness results in a half-million dollars' fire loss in Newark every year." These words were printed in large black letters on a card in the exhibit which was shown in the corridors on the third floor of the city hall in observance of Fire Prevention Day. "Think Fire—Before it Happens" was the wording on another sign. Captain C. Albert Gasser of the Bureau of Combustibles and Fire Risks, ran the exhibit for three days. Inspectors from the bureau cooperated with officials of the State department of labor in handling fire drills at various factories in the city. Many people visited the exhibit composed of pictures of fires and fire ruins and literature posted on screens. Most of the pictures were used in for-

Harrisburg, Pa.—Pennsylvania's fire loss is $25,000,000 annually, approximately $50 per minute, and fire marshal G. Chal Port impressed this on the public on Fire Prevention Day in every possible way. A proclamation issued by Governor Brumbaugh called upon every citizen of the state to observe the day by cleaning homes and buildings and destroying all rubbish, and it was very effective. In some municipalities special exercises were conducted in the school and in the fire houses. In Reading there were a number of elaborate features in the observance of the day. Thousands of copies of the governor's proclamation were distributed throughout the state. In addition ten thousand posters in bright colors were posted in every city, borough, town and hamlet. Fire marshal Port made a special appeal to farmers of the state to keep their premises clear of rubbish so that danger of the fire hazard in these war time be lessened. "The destruction of one barn filled with this season's bumper crops," he said, "means additional hardships for our fighting forces in France."

Sioux City, Ia.—Sioux City fire insurance agencies, in cooperation with the Commercial club, celebrated Fire Prevention Day in a really practical way. In former years, fire prevention day has never, in Sioux City, gotten further than a more or less scattered effort to "clean up" a few premises here and there. This year at least the business district received real attention. With experienced fire insurance agents as captains of 14 committees, other members also from the roster of the Commercial club, a survey of conditions in the business district was made and reported to the club. From this general investigation and report are expected to come valuable suggestions and recommendations from the Commercial club, which will result in material improvement in the fire hazards.

Two Big Fires in 24 Hours.

St. Paul, Minn.—Twenty firemen were overcome, temporarily blinded or injured, and property valued at more than $130,000 was destroyed when fire, undoubtedly of incendiary origin, destroyed the plant of the Twin City Hardwood Lumber company, and damaged the Twin City Varnish company's stock. The fire followed so closely one on the night before, which destroyed the H. B. Waite Lumber company buildings and yards which adjoined the Twin City Lumber company yards, that it was believed at first that sparks from this fire had started the second. But careful investigation of both fires caused the authorities to assert that there was no connection between them and that both were incendiary. Revised estimates of the damage to the Waite company caused the loss to ascend to $160,000, making the total loss within twenty-four hours to property in one square block reach nearly $300,000. A time bomb, carefully set and constructed, was believed by the police to have caused the Twin City company fire. Gasoline or some other highly inflammable substance was thought to have been used in the Waite fire. All the injured men suffered from the dense, sickening smoke which poured from the hardwood lumber. Repeatedly the men were drenched by streams of water as they struggled in the midst of solid walls of flames which shot fifty feet in the air. In addition, a strong wind which fanned the flames continually blew bitterly cold against the drenched men. Men were carried from the flames with their eyes closed by the heat and smoke. James J. Conway, district fire chief, who narrowly had escaped death by electrocution in the fire of the night before, was carried home overcome. James Mulcrone, captain of truck company No. 6, and his son, Emmett Mulcrone, a member of the same company, fought side by side, leaving the huge piles of blazing timber only for a fresh breath of air. Finally both collapsed and were taken home. Chief Devlin turned in a call for every available piece of fire apparatus in the city. Five minutes later nearly a block of lumber buildings was burning. Not one hundred feet from the fire was the Manhattan Oil company and two 50,000-gallon tanks filled with gasoline. Near by were other lumber yards, frame buildings and homes, all highly inflammable. Disregarding danger, the St. Paul firemen fought to save a conflagration which would have wiped out the entire district. Three leads of hose were placed across the St. Paul road tracks nearby. Traffic was held up until railroad men dug a trench under the tracks and placed the hose in them. Several sections of hose were burning up when firemen, caught in pockets, were dragged out by comrades who did not have time to save the hose. Minneapolis firemen helped fight the blaze.

Three Firemen Killed in Lodging House Blaze.

San Francisco, Cal.—Three firemen were killed and twenty others were injured by a falling mass of blazing timbers when a lodging house collapsed. The dead are: first assistant chief Stephen D. Russell, Joseph L. Allen, of engine No. 9, and Timothy Collins, truck company No. 1. Three minutes before the blazing walls buckled and crashed to the ground fire chief Thomas R. Murphy had ordered all his men from the three-story frame building. Thirty firemen stood in the vacant lot next the building, when, with a groan, it fell toward them. A few had time to stumble out of the falling mass, but the rest were caught. Firemen leaped over the hose and attacked the boards with their axes. A few crawled under, and their cries for help were added to those of the men within. Excited men yelled for the six ambulances, held a block away. Soldiers and sailors broke through the police lines and rushed to the pile of blazing debris. Then they began to take the men out through the hole they had cut in the boards. Dazed firemen, not badly hurt, but covered with mud and soot, came first. The men caught under the heavier load of falling timber were rescued last. "Responsibility for these deaths lies in the city's failure to condemn these flimsy firetraps," said chief Murphy, as he learned that three of his men had been killed. "Time after time we have asked them to condemn buildings like this, but they haven't done it." The lodging house and the storehouse were totally destroyed. The property loss was estimated at more than $50,000. Hundreds of tons of grain and feed owned by a number of persons and firms were destroyed by fire or ruined by water. Chief Russell was 60 years old and had been in the service many years. News that firemen had been killed reached the members of the Retail Dry Goods Association while they were holding their annual banquet. The association at once appropriated $500 for the relief of the families.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Oct. 16-19.—LEAGUE OF KANSAS MUNICIPALITIES. Annual convention, Wichita, Kan. Secretary, Homer Talbot, University of Kansas, Lawrence, Kan.

Oct. 17-18.—LEAGUE OF MINNESOTA MUNICIPALITIES. Fifth annual convention, St. Cloud, Minn. Secretary-treasurer, Richard R. Price, University of Minnesota, Minneapolis.

Oct. 17-19.—AMERICAN PUBLIC HEALTH ASSOCIATION. Annual meeting, Washington, D. C. Acting Secretary, A. W. Hedrick, 126 Massachusetts Avenue, Boston, Mass.

Oct. 17-24.—AUSTRALIAN TOWN PLANNING CONFERENCE AND EXHIBITION, Adelaide, Australia. Organizing director, Charles C. Reade, government town planner, Education Buildings, Adelaide, South Australia.

Oct. 22-24.—AMERICAN CIVIC ASSOCIATION. Annual meeting, St. Louis, Mo. Secretary, Richard B. Watrous, 914 Union Trust building Washington, D. C.

Oct. 28-30.—TEXAS CONFERENCE ON SOCIAL WELFARE. Annual convention, Houston, Texas.

Nov. 13.—NATIONAL TAX ASSOCIATION. Annual conference, Atlanta, Ga. Secretary, Fred R. Fairchild, Yale University, New Haven, Conn.

Nov. 14-16.—FIRE MARSHALS ASSOCIATION OF NORTH AMERICA. Annual convention, New Orleans, La. Secretary, W. M. Campbell, New Orleans, La.

Nov. 15-16.—ASSOCIATION OF URBAN UNIVERSITIES. Annual meeting, Pittsburgh, Pa. Secretary, Frederick B. Robinson, City College, New York, N. Y.

Nov. 19-24.—CITY MANAGERS' ASSOCIATION. Annual meeting, Detroit, Mich. Secretary, W. L. Miller, City Manager, St. Augustine, Fla.

Nov. 20-21.—ASSOCIATION OF GOVERNMENTAL RESEARCH AGENCIES. Third annnal meeting, Detroit, Mich. Secretary, C. O. Dustin, Statistical Bureau, Red Cross War Council, Washington, D. C.

Nov. 20-23.—PLAYGROUND AND RECREATION ASSOCIATION OF AMERICA. Recreation Congress. Secretary, H. S. Braucher, 1 Madison Ave., New York, N. Y.

Nov. 21-24.—NATIONAL MUNICIPAL LEAGUE. Twenty-third annual meeting, Hotel Statler, Detroit, Mich. Secretary, Clinton Rogers Woodruff, 703 North American Bldg., Philadelphia, Pa.

Jan. 3, 4.—NEW JERSEY STATE LEAGUE OF MUNICIPALITIES. Annual convention, Trenton, N. J. Secretary, Clinton A. Swartz, Trenton, N. J.

Jan. 15-17.—VIRGINIA GOOD ROADS ASSOCIATION. Seventh annual convention, Richmond, Va. Secretary, C. B. Scott, Richmond, Va.

Feb. 6-13.—FIRST CHICAGO CEMENT MACHINERY AND BUILDING SHOW. Supersedes annual Chicago Cement Show. Held at the Coliseum, under direction of the National Exhibition Co.

March 17-24.—PAN-AMERICAN CONGRESS ON CHILD WELFARE, Montevideo, Uruguay. Secretary, Edward N. Clopper, 105 East 22d Street, New York, N. Y.

Illinois Conference of Charities and Corrections.

An imposing list of speakers has been announced for the state conference of charities and corrections scheduled to open at Joliet Oct. 26, and continue to Oct. 28. In addition to Gov. Lowden, Mr. Hoyne and Judge Pam, many prominent educators, reform and charities workers are on the program.

Katherine Bement Davis, chairman of the New York parole commission; Senator Harold Kessinger; Miss Harriet Vittum; Dr. Herman M. Adler, state criminologist; Judge Victor Arnold, of the juvenile court of Cook county; Mrs. Gertrude Howe Britton, director of the Cook county bureau of social service; Miss Mary Bartemele, assistant judge of the Cook county juvenile Court; Dr. Kirchwey, former warden of Sing Sing prison; Prof. Robert Gault, of Northwestern University, editor of the American Journal of Criminal Law and Criminology; A. L. Bowen, state superintendent of charities; and other prominent men and women will also be speakers at the convention.

National Paving Brick Manufacturers' Association.

A general conference of the paving brick industry will be held in Cleveland, Ohio, November 19 and 20, 1917. All members of firms, board members of companies and other persons having financial interests in the business are invited and urged to attend this important meeting. The program for the meeting is under preparation, and this together with detailed information regarding the meeting will be sent all manufacturers of paving brick as soon as prepared.

League of Wisconsin Municipalities.

Mayor H. W. Adams of Beloit, was elected president of the League of Wisconsin Municipalities at the convention held at Chippewa Falls, Sept. 25-27. Mayor T. W. Thiesen of Racine, was elected vice-president and Ford H. McGregor, the present secretary-treasurer, was reelected to that office. The other officers recommended for election by the nominating committee, and elected by the convention follow: Board of Trustees—Mayor Daniel Hoan, Milwaukee; Mayor John Mulva, Oshkosh; Mayor Joseph Konkel, Superior; Mayor C. B. Clark, Neenah; Mayor H. W. Adams, Beloit. District Vice-Presidents—First, Mayor H. A. Runkel, Burlington; Second, Mayor John Kaiser, Port Washington; Third Mayor George Sayle, Madison; Fourth, Mayor Hans A. Koenig, Wauwatosa; Fifth, Senator Schultz, Milwaukee; Sixth, Mayor Hohensee, Fond du Lac; Seventh, Mayor A. A. Bentley, La Crosse; Eighth, Mayor H. E. Marquardt, Wausau; Ninth, Mayor Elmer Hall, Green Bay; Tenth, Mayor Geo. E. Dee, Chippewa Falls; Eleventh, Mayor Grant W. Clarke, Rhinelander.

The convention opened Wednesday afternoon with an address by Mayor T. W. Thiesen, Racine. Mayor Joseph Konkel, Superior, made the response. The president's address was given by Mayor C. B. Clark, Neenah. At the evening session an illustrated address on Milwaukee's new street lighting system was given by F. A. Vaughn, Milwaukee. A second illustrated lecture on bituminous pavements was given by John S. Crandall, New York.

On Thursday there were addresses by Dr. J. M. Furstman, La Crosse; Judge Charles D. Rosa, Beloit; H. G. Meigs, West Allis; Senator Ray P. Wilcox, Eau Claire, and Frank W. Lucas, Madison. The evening was given over to the address of Colonel Roosevelt on the war situation.

On Friday there were addresses by A. H. Melville, secretary of the State Council of Defense; M. J. Gillen, Racine; State Food Commissioner George J. Weigle, and Prof. J. L. Gillen of the university.

Michigan Conference of Charities and Corrections.

Arrangements for the Michigan state conference of charities and corrections to be held in Lansing, October 21, 22, 23, have been completed by the committees in charge. Speakers secured for the program hold nation-wide reputations and the topics will be of general community interest.

The opening meeting October 21 will be addressed by Dr. John G. Benson, of Detroit, who is the superintendent of social service, Detroit Area Methodist Episcopal church, and associated with social service at the Battle Creek cantonment.

Much ground will be covered in the addresses given between the hours of 9 a. m. and 12:15 Monday. Social aspects and health standpoints of the urban and rural conditions will be discussed by Dr. William DeKlein, Flint health officer; Miss Mary Marshall, of Battle Creek; Miss Edna Connor, of Cheboygan; Miss Blanche Post, of Grand Haven; Miss Mary McClure, of Kalamazoo, and Mrs. Henry Heering, of Grand Rapids. Dr. A. S. Warthin, of Ann Arbor, will address the meeting on the proposed program for control of general diseases in Michigan. Problems in care of the blind will be introduced by Roberta Griffith, of Grand Rapids, and Mrs. Eva Brewer Palmer, of Cleveland.

In the afternoon welfare of Michigan children will be discussed by Fred M. Butzel, William J. Norton and George J. Bedirger, all of Detroit.

At 4 p. m., Lansing institutions and other places of interest will be visited. A dinner will be served following the trip. Governor Albert E. Sleeper will preside over the evening meeting. Social aspects and war problems will be the topics considered by John B. Andrews, New York city, Miss Helen Y. Reid, director and convener of ladies' auxiliary of Canadian patriotic fund, Montreal, and T. J. Edmonds, acting director of civilian relief of the Chicago chapter of American Red Cross.

Community programs for social service as related to war conditions will be discussed Tuesday morning, under guidance of group leaders. T. J. Edmonds will again address the meeting on "Practical Programs for Civilian Relief of Red Cross." Miscellaneous problems will be treated by the following speakers: Judge C. B. Colling-

wood, Miss Marguerite Erikson, Lansing; Mrs. Lena P. Yax, of Jackson; Edith S. Reider, International Harvester company, Chicago; John G. Benson, Detroit; David A. Glascoff, Lansing; Harry L. Allen, Grand Rapids.

The final meeting will be held at the Michigan Agricultural College, Tuesday afternoon, following a luncheon at the Chamber of Commerce. Rural problems will be taken up by various professors. Speakers are as follows: Dr. Ward Giltner, bacteriology; E. C. Lindemann, Extension; T. H. Ryder, Economics, and field workers and students in attendance and in the employ of the college.

Montana Good Roads and Automobile Association.

The annual convention of this association was held at Helena, Sept. 28. Miles City was selected as the meeting place for the 1918 convention, and officers were elected as follows:

Oscar Rohn, of Butte, re-elected president. L. Newman, of Great Falls, first vice-president; Henry Goode, of Kalispell, second vice-president, and R. S. Phillips, of Butte, secretary. These officers, with A. L. Love, of Bozeman, V. S. Hymsel, of Plevna, R. B. Kelley, of Anaconda, and L. E. Carroll, of Roundup, constitute the board of directors.

Massachusetts State Firemen's Association.

Many interesting papers and addresses were presented at the annual convention of this association, which was held at Nahant Sept. 24 to 26. The president, William S. Smith, of Gloucester, opened the convention Wednesday afternoon.

Interesting papers were presented at the various meetings as follows:

Wednesday afternoon—"Bills affecting firemen considered by the Massachusetts legislature of 1917," Captain James F. McKissock, of Lowell.

"The value of inspection by members of fire department," Chief W. C. Shepard, Pittsfield.

"General description of the first fire department flying machines or flying apparatus which is a part of the equipment of the San Diego, Cal., fire department," Chief Louis Amgren, San Diego, Cal.

Evening—"Fire hazards in hospitals, public and private," William E. Holt, chief engineer state infirmary, Tewksbury.

"The practical working of the two platoon system," George F. Doyle, engine company 10, Boston.

Thursday—"The underwriters' views on the two platoon system," George W. Booth, chief engineer national board of fire underwriters, New York, N. Y.

"Speed limit of fire apparatus going to and returning from an alarm of fire," Louis N. Baudoin, Fairhaven.

"What a fireman who is selected to drive motor apparatus or who is a candidate for chauffeur in fire departments should know and how best to procure the information," T. E. Flanagan, ladder company No. 4, Boston.

"Sprinklered risks," Paul Mason, fire prevention engineer, New York.

"Should firemen be detailed to theatres, moving picture shows and other places of amusement as a precautionary measure in the interest of fire prevention," John A. O'Keefe, fire prevention engineer, Boston Metropolitan district.

Evening session at 7.30—"The effect to firemen of a constitutional amendment providing for the initiative and referendum, also of the anti-sectarian and pensioned amendment to the bill of rights," George Frye Merrill, delegate to the constitutional convention, Gloucester.

Friday—"Story of the National Fire

(*Continued on page 394.*)

PROBLEMS CITIES ARE STUDYING WITH EXPERTS

The state of Pennsylvania department of buildings and grounds is to construct a HIGHWAY BRIDGE to cost $195,000. The engineers for the work are Paxson & Morgan.

PAVING IMPROVEMENTS are to be made by Augusta, Kan., following the preparation of plans and specifications by the consulting engineering firm of Black and Veatch.

The WATERWORKS of Galena, Mo., are to be improved at a cost of $100,000. Plans and specifications for the improvement are being made by the firm of Burns & McDonnell.

An OUTFALL SEWERAGE SYSTEM is being built by Santa Barbara, Cal. The system was planned by the firm of Olmstead & Gillelen.

A SEWERAGE SYSTEM is to be constructed by Lind, Wash., plans for the work having been completed by the engineers, Sawyer Bros.

A SEWAGE DISPOSAL PLANT is to be built by Milton, Pa., plans for the improvement having been completed by the consulting engineer, Alexander Potter.

Pender, Neb., is building WATERWORKS and an ELECTRIC LIGHT PLANT. The engineers for the improvements are the Henningson Engineering Company.

Bristow, Okla., contemplates a number of STREET IMPROVEMENTS and extension to the SEWER and WATER SYSTEMS. The Benham Engineering Company has been retained to advise on these improvements.

Luzerne county, Wilkes-Barre, Pa., is to construct a VIADUCT. The consulting engineer on the project is David A. Keefe.

Columbia, Ill., is having plans for a municipal ELECTRIC PLANT prepared by the engineers, the Fuller-Coult Company.

Potococowa drainage district, Carrollton, Miss., is planning extensive RECLAMATION WORK. The Morgan Engineering Co. has been retained to make surveys and prepare plans.

A WATER TANK is to be built by Le Sueur Center, Minn., plans and specifications having being prepared by Earle D. Jackson, the consulting engineer.

Salem, N. J., is to install new pumping equipment in its WATERWORKS. Plans and specifications for the improvement were prepared by the engineer, William H. Boardman.

A SANITARY SEWER SYSTEM and DISPOSAL PLANT are to be constructed by Allentown, Pa., at a cost estimated at $1,500,000. New plans for the work have been started, the consulting engineer being Wm. H. Ennis.

Portsmouth, Va., is making an investigation of the WATER SUPPLY situation. The city has retained the Scofield Engineering Company to make a VALUATION of the property of the Portsmouth, Berkley and Suffolk Water Company and to make a SURVEY of the availability of possible sources and to report on qualities of water supplies.

PERSONALS

McAneny, Edward G., has been appointed Title Examiner for the city of Yonkers, N. Y.

Gardiner, William Gwynn, has been appointed a commissioner of the District of Columbia.

Hicks, L. G., has resigned as city engineer, of Roseburg, Ore.

Smith, Wm. M., head of the electrical department of Norfolk, Va., has resigned.

Bennett, M. O., division engineer of the Eastern Oregon Highway District, has resigned.

Palmer, W. K., head of the firm of W. K. Palmer Co., consulting engineers of Kansas City, Mo., has been commissioned a major in the engineer corps and will discontinue his practice for the period of the war.

Reese, L. R. P., has resigned as assistant city engineer of Fort Collins, Col., to attend the reserve officers' training camp.

Kurtz, F. E., has resigned as highway engineer of Jackson County, Ore.

Plumley, G. S., has opened an office at Charleston, W. Va., to engage in the practice of civil and mining engineering. For the past ten years Mr. Plumley has been chief engineer of the Blue Creek Coal and Land Co., and of the Kanawha & West Va. Railroad Co.

Keenan, John T., formerly assistant engineer of the Providence board of water supply, has been commissioned a major in the engineer reserve corps.

NEW APPLIANCES

Describing New Machinery, Apparatus, Materials and Methods and Recent Interesting Installations.

SMITH WHEEL.

Of Special Metal Construction for Motor Vehicles.

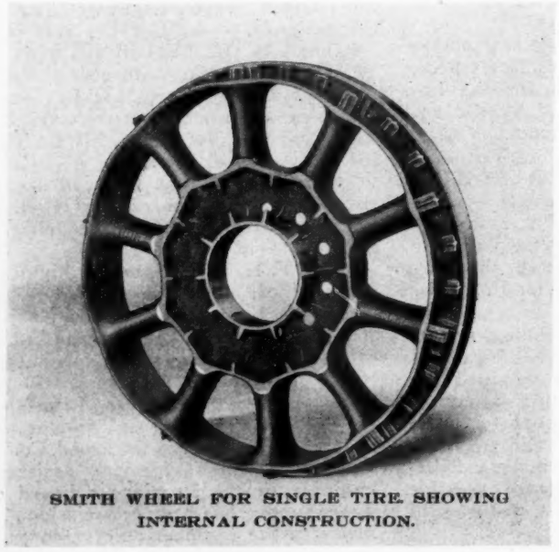
European experience, especially marked during the war, has demonstrated to manufacturers and users many advantages of the metal wheel for motor vehicles, and the wooden wheel has over there been largely superseded. The metal wheel has been found practicable and economical in commercial vehicle service. Increased mileage of tires is a powerful reason given for the change. In all cases of using metal wheels many thousand miles have been added to the service of the tire, it is claimed. Increased gasoline mileage is also indicated by the data of actual practice. Unlike wooden wheels, it is said, metal wheels remain round and true, and do not change shape in taking and leaving the ground. Joints do not come loose in a metal wheel. These three conditions make for conservation of power in the case of the metal wheel. Smooth running also adds considerable strength and increased life to the truck itself.

These are the basic features emphasized in the design and construction of the Smith metal wheel. This is a light, one-piece metal wheel of hub, spoke and felloe type. It is hollow throughout, but internally reinforced with suitable braces which are so arranged as to distribute equally the stress of any load, strain or blow that can be applied from any angle. In making Smith wheels a metal alloy of great strength has been used. By special heat treatments the metal is made tough and elastic to the highest degree. The metal of which the wheel is constructed is 5-32 of an inch thick. As shown in the illustrations, a large number of internal braces connect the two outer walls, bracing them against each other. This construction is claimed to result in a wheel which is lighter than a wooden wheel of the same dimensions and much stronger. This superior strength is held to be due to the one-piece design itself; the employing throughout of the principle of curves, instead of many pieces with flat surfaces and sharp angles, thus eliminating starting points for giving way under strain; and to the toughness and resiliency of the metal as against wood.

SMITH WHEEL. REAR. OFFSET SPOKE TYPE. FOR DUAL OR LARGE SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

The Smith wheel is made round and true, and the original shape is not distorted by length or severity of service. This quality makes for even wear on tires and tire manufacturers have asserted, after test, that tire mileage may be increased 40 per cent with the use of the Smith wheel. Again, it is claimed that heat from road friction is a great factor in rubber tire deterioration, wood being a non-conductor, and the solid felloe not giving the heat a chance to get away from the tire. In the case of the Smith wheel, however, it is asserted that the metal is a good conductor, and it has a hollow felloe and hollow spokes. With this air space and the numerous internal braces, the heat is quickly conducted away from the tire.

In wooden wheels the entire load is carried immediately under the ends of the spokes that stand directly below the axle. This forces the wooden felloe into a conical shape, with the diameter at the edge considerably less than at the spoke-bearing. The result is unequally distributed pressure on the tires, the pressure lessening as the outside of the felloe is neared. This causes greater tire wear, as a line that would cover the center of each spoke-end is approached, and at the end of every spoke the wear is still more accentuated, as the spoke does not yield. Because of the one-piece construction the load is equally applied to the spokes, both above and below the axle, and the fillets of the spoke at the felloe distribute the weight equally over the whole surface of the rubber. Because of this design and the



SMITH WHEEL FOR SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

SMITH WHEEL. REAR. CENTRAL SPOKE TYPE. FOR DUAL OR LARGE SINGLE TIRE. SHOWING INTERNAL CONSTRUCTION.

consequent retaining of the shape of the wheel, the continuous even service and wear result in not using up excess power and gasoline. The avoidance of shocks and jars reduces wear on driving mechanism, and increases the life of the machine.

Moisture, drouth, heat, cold, heavy loading and grilling service do not affect the metal wheel, and contractors have found it particularly serviceable. The danger of collapse under strain is obviated. Painting and washing are simplified, and the appearance of the wheel is improved. The felloe is designed to take chains readily, and without being cut or splintered. Maintenance charges are eliminated.

Smith wheels are made for trucks of any size, and to fit any axle in any capacity. Two general types are made —with central spoke and with offset spoke, both of which are illustrated. Rear wheel and front wheel and single and dual designs are made. The wheels are made for use with solid tires only. The wheels are also furnished for either pressed-on or demountable tires as desired.

Laboratory tests under conditions more severe than those of actual service have been made to show the strength of the metal wheel. A load of 50,000 pounds was applied to a spoke section cut from a front Smith wheel. The tire would stand no more pressure, but in similar tests, with the spoke section resting on a wheel plate cut to the curve of the felloe, no signs of strain were apparent under a load of 43 tons. In another test a wheel, taking 40x6 dual tires, was cut in half to get it under the ram (reducing its normal resistance), and a steadily increasing pressure up to 50 tons was applied. The deflection of the arch between the spokes was increased by micrometer and in repeated tests the deflection was found to increase gradually from 0.002 of an inch at five tons to 0.033 at 50 tons—far within the elastic limits of the metal. In a third test the resistance of the wheel to dishing was demonstrated. With a 40x6 dual tire a load of 50 tons was applied to the section of the unsupported bare hub, with a resulting deflection of 1-32 of an inch. When the load was removed, the hub returned to its original position.

The accompanying illustrations show the construction of the single and dual tires, both the central and offset spoke types. The wheel described is made by Smith Wheel, Inc., Syracuse, N. Y.

MACON CONCRETE PAVING ROLLER.

For Compacting Surface and Removing Excess Water.

Among the methods of finishing concrete pavement which have received strong endorsement from prominent highway engineers is the use of a roller as practiced on concrete street paving in the city of Macon, Ga. This method was originated by Captain J. J. Gaillard, city engineer of Macon, and has so proved its advantages that its use is being widely followed elsewhere. Rollers of this type developed by Captain Gaillard have now been placed on the market.

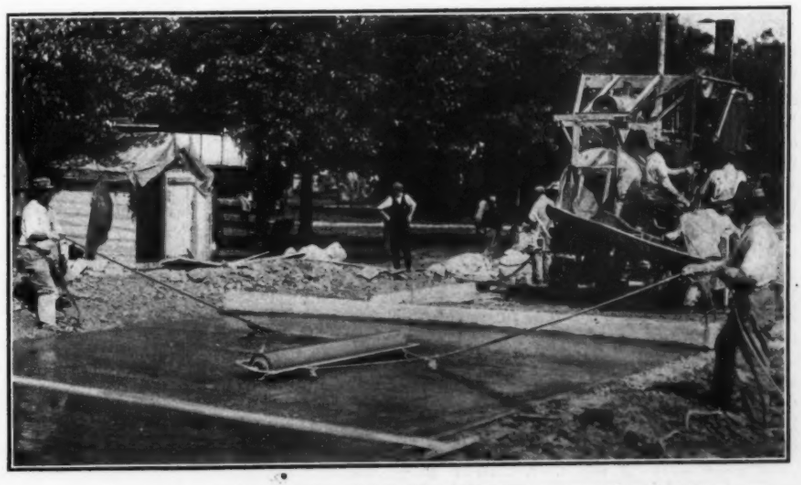
In concrete street or road construction for ease of manipulation it is necessary to use a little more water in the concrete mixture than is required for the greatest strength of concrete. Until the advent of the roller method, the objections to this excess quantity of water in the concrete could not be readily overcome, but with the roller finishing method developed by Captain Gaillard much of the excess water is removed from the concrete in the process of rolling, while at the same time the concrete is considerably compacted.

The result of using the roller was recently described by A. N. Johnson, consulting highway engineer of the Portland Cement Association. Mr. Johnson says: "The effect of the roller is that of a rolling squeegee. It consolidates the top layer of the concrete and removes practically all of the surplus water. At the same time it takes out the slight uneven places in the surfaces which may occur, particularly if the pavement has been struck by a template. The rolling should be continued until free water ceases to come to the surface."

Mr. Johnson also described "Tests of Concrete Slabs to Determine the effect of Removing Excess Water Used in Mixing," in a paper presented at the twentieth annual meeting of the American Society for Testing Materials. This paper was based on experiments made by finishing concrete slabs by a wood float and by the roller method. Tests were conducted at the Structural Materials Research Laboratory, Lewis Institute, Chicago, under the supervision of Mr. Johnson, and D. A. Abrams, professor in charge at the laboratory who collaborated in this work. The results of tests brought out the fact that slabs finished with the roller developed 20 per cent increase in strength over slabs merely hand finished. The appearance of broken slabs disclosed a marked difference between those finished with the roller and those finished with the hand float. The former had a distinctly denser appearance which extended for at least half the depth of the slab. Highway engineers have followed with interest the disclosures made by these recent tests, and have taken advantage of the ideas developed.

Since field operations in concrete highway work do not permit the use of a concrete of the most desirable consistency, with particular reference to the strength of the concrete, the roller method of finishing, which removes much of the excess water, is especially desirable. The cost of finishing is also greatly reduced and the result is claimed to be a better finish than can be obtained with either hand float or belt.

The Michigan State Highway Association, for instance, recently had ten rollers put on work in that State. The Macon concrete paving roller has been part put on the market by the Ransome Concrete Machinery Company, 115 Broadway, New York City.



MACON CONCRETE PAVING ROLLER ON THE JOB.

INDUSTRIAL NEWS

Cast Iron Pipe.—Prices remain at the same level after the big drop of $15 per ton on all sizes, announced last week. Since the Federal regulations are effective until Jan. 1, 1918, no further decrease is expected until then. It is expected that cities will begin asking for bids for future needs. Quotations: Chicago, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. New York, 4-inch, class B and heavier, $53.50; 6-inch, $50.50. Birmingham, 4-inch, class B and heavier, $48; 6-inch, $45; class A, $1 extra.

Completion of United States Army Truck.—The following statement was given out by the automotive products section of the war industries board of the Council of National Defense: "Another war-time achievement of American engineering and manufacturing genius is disclosed in the completion of the first United States heavy-duty war truck. This truck, on the design of which the Quartermaster's Depart-

ment of the Army has been working since the 1st of August, was first completed at Lima, Ohio. Another truck was assembled in Rochester, N. Y., the next day, and started on the road. It is confidently believed that the United States war truck will prove to be one of the most valuable transportation factors yet developed for modern war. In its creation the Government has utilized the mechanical brains of the country best qualified for the job, with the result that the war truck was developed in little more than a month's time.

Both of the trucks referred to are the class B truck designed for a 3-ton load, but with capacity for 5 tons. The two trucks that have been assembled have exceeded the expectations of not only Brig. Gen. Chauncey B. Baker, of the Quartermaster's Department, which has directed the work, but also of the two score of engineers and hundreds of draftsmen who worked on the design in Washington. Early tests of the engine showed 58 horsepower at 1,350 revolutions per minute, and the engine torque curve is better than anticipated. It is felt that the United States heavy-duty war truck will go far to revolutionize army truck work so far as operation and maintenance are concerned, and that the truck will play a large part in affecting truck design in commercial circles.

That the War Department, as well as the members of the Society of Automotive Engineers who cooperated in the design work, are convinced that the truck is right, is shown by the fact that orders for 10,000 parts for the truck have already been placed, these orders including engines, axles and other parts. These orders have been widely placed over the industry, three or more different companies generally receiving orders for each of the different parts.

The work of speedy cooperation that characterized the production of the Liberty aviation engine has been equaled in the case of the war truck. In spite of the fact that a larger number of interests were involved in the building of the truck, making compromises in design more difficult, the great unanimity of feeling among those participating makes the result the more remarkable. Roughly, there were four major divisions of the engineering work, those relating to the engine, the transmission, the axles, and the other chassis parts. Each was manned by a corps of engineers. There were three, four and, in some cases, five different companies represented in the work on one unit, and it was naturally necessary for the engineers to subordinate all personal considerations to the end of achieving the very best known to the art. Each unit represents a composite of the best features contributed, rather than the work of any one individual. The engineer best qualified to design a certain part handled it in consultation with his fellow engineers.

In summarizing the cooperative talent embodied in the engine, it might be said that the crank case is Continental; the cylinders, Waukesha; the oiling system, a combination of Wisconsin and Buda; the pistons, Hercules; and the timing-gear system, a combination of Buda, Wisconsin and Continental. The governor is a combination of Kelly-Springfield and Waukesha. The cam shaft is a composite design. The engine has been designed with the thought of using the heavier fuels, the combustion chamber and other parts having been designed to meet these requirements.

What has been said of the engine can be said of the transmission, the axles and other parts. Three or four of the leading axle makers have worked together on the axle designs. So with the transmission.

So well have all of the engineers cooperated that the schedule set for the completion of the different truck units as well as of the completed truck, has been lived up to and generally improved upon. The first engines built in different factories were to have been delivered on September 30, and they were delivered on that date. The completed chassis was to have been ready October 10, and was ready on October 7.

The Nye Odorless Crematory Company, Georgia Casualty building, Macon, Ga., was awarded the contracts by the Government for the incinerators of all the army cantonments it could handle. Plants have been built from Massachusetts to Texas. Including three municipal plants, the company at one time had twelve different jobs under construction; this situation is considered by the company unique in the incinerator business.

Joseph T. Ryerson & Son have moved their Philadelphia office from 423 Commercial Trust Building to 1103 Widener Building.

Hendricks' Commercial Register for Buyers and Sellers.

The twenty-sixth annual edition of Hendricks' Commercial Register of the United States for Buyers and Sellers has just been published. The register has been found of great value to city purchasing agents, heads of departments, council committees and also contractors, and the new edition should prove as indispensible as those of former years. This standard publication is especially devoted to the interests of the architectural, contracting, electrical, engineering, hardware, iron, mechanical, mill, mining, quarrying, railroad, steel and kindred industries. Full lists are included of producers, manufacturers, dealers and consumers, listing all products, from the raw material to the finished article, together with the concerns handling these products, from the producer to the consumer. There are 2,209 pages of text matter, and the index to trade classifications numbers 151 pages, covering over 50,000 trade references. The list of trade names, brands, titles of identification, etc., numbering 1,212 pages, furnishes ready reference to distinctive products manufactured by concerns listed in the work. The alphabetical section is included for the first time, and contains in one alphabetical list the name, trade description and address of every concern appearing in the book. The volume is published by S. E. Hendricks Company, Inc., 2 W. 13th St., New York, at the city price of $10.00.

NEWS OF THE SOCIETIES

(*Continued from page* 391).

Protection association and how to describe the evidence of kerosene at incendiary fires," Secretary Franklin H. Wentworth, Boston.

"The advantages and disadvantages in the use of wire glass when fire occurs," Deputy Chief Daniel F. Sennot, Boston.

Ohio Conference of Charities and Corrections.

Columbus was picked for the 1918 convention of the Ohio state conference of Charities and Correction by the delegates who met in Springfield, Oct. 2-4. At the meeting Wednesday night the following officers were elected:

James L. Feiser, Cleveland, president; C. W. Hoffman, Cincinnati, first vice-president; Dr. Frances M. Hollingshed, Columbus, second vice-president; J. O. White, Cincinnati; the Rev. E. A. Coil, Marietta; W. H. Stoutt, Uhrichsville; the Rev. C. H. Leblond, Cleveland; Mrs. Pauline Steinem, Toledo; J. W. Wheeler, Columbus, executive committee.

Dixie-Overland Highway Association

At the annual convention of the Dixie-Overlaand Highway Association, held at Meridian, Miss., Sept. 6, officers were elected for the ensuing year as follows:

John S. Bleecker, Columbus, Ga., president, re-elected; Cliff Williams, Meridian, vice president at large.

Executive committee: John S. Bleecker, Columbus, Ga.; J. A. Waterman, Hawkinsville, Ga.; J. H. Drakeford, Tuskegee, Ala.; R. Curtis Jordan, Columbus, Ga.; Leland J. Henderson, Columbus, Ga.

State vice presidents: Georgia, W. A. Johnson, Savannah; Alabama, C. C. Clay, Demopolis; Mississippi, Frederick Sullens, Jackson; Louisiana, E. K. Smith, Shreveport; Texas, E. T. Peters, Dallas; New Mexico, Francis E. Laster, McSillea Park; Arizona, J. J. Bowman, Bisbee; California, Ed. Fletcher, San Diego.

Leland J. Henderson, Columbus, Ga., was re-elected secretary. County vice presidents for Alabama were named as follows:

D. W. Williams, Marvyn, Ala.; J. W. Maybury, Society Hill, Ala.; W. P. Dowling, Tuskegee; Geo. Wheeler, Montgomery; S. M. McCurdy, Jr., Lownesboro; Dudley Coleman, Uniontown; Allen Collins, Allenville; N. L. Lee, Demopolis; P. E. Jarman, Livingstown; A. J. Atkins, Selma; I. J. Moses, Girard, president; D. A. Floyd, Phoenix, vice president, state organization.